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TITLE: A Longitudinal Study of Emotional Distress and the Use of
Complementary and Alternative Medicine in Women with
Breast Cancer

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13. ABSTRACT (Maximum 200 Words)

The study purpose is to examine the extent to which levels of depression and anxiety and coping at 3-5 months post-diagnosis are related to complementary and alternative medicine (CAM) use at initial assessment (T1) and follow-up at 9 (T2) and 15 (T3) months. This study will also identify the types of CAM sought after by women with higher levels of anxiety and depression. Seventy-one women completed the survey at T1 and 40 women completed the follow-up survey at T2. Data collection is continuing for T2 and T3. Cross-sectional and repeated measures analysis found no effect for anxiety or depression at T1 and T2 on CAM use at either time point. However, when we looked at earlier CAM use as a predictor of later emotional distress, CAM use predicted anxiety and depression, with the effect varying by type of CAM used. The award has supported a quality training experience for the trainee and has supported her to continue to make satisfactory progress on her dissertation.

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Table of Contents

Introduction

The purpose of this study was to examine the extent to which levels of depression and anxiety and coping at three-five months post-diagnosis are related to complementary and alternative medicine (CAM) use at initial assessment and follow-up at 9 and 15 months. This study also proposed to identify the types of CAM sought after by women with higher levels of anxiety and depression. Additional aims of the study were to provide pilot data for further research in developing interventions (such as mood regulation skills, coping skills training or treatment information) to meet the emotional needs and healthcare expectations of breast cancer patients. This study was funded as a predoctoral training grant. The research study served as Ms. Shumay's doctoral dissertation.

Body

This longitudinal study explored emotional distress, coping response and complementary and alternative medicine (CAM) use at two time points early after diagnosis with breast cancer. Participants were women of Caucasian, Native Hawaiian, Japanese, and other Asian (Chinese, Filipino and Korean) ethnicities living in Hawaii and recruited through two breast cancer clinics and the American Cancer Society. Self-report questionnaires included the State-Trait Anxiety Inventory, the Center for Epidemiological Study Depression Scale, the Mental Adjustment to Cancer scale, a measure of CAM use designed for the study, and questions about demographics and treatment history.

Seventy-one women completed the survey at T1 (on average 3 months post-diagnosis) and 40 women completed the follow-up survey at T2 (9 months post-diagnosis). The number of participants enrolled fell short of the projected number in my proposal of 125 due to the small number of women diagnosed in Hawaii, limited access to clinical populations and time constraints. Some T2 and all T3 data are not reported here as they were not available yet at the time of this report. Those enrolled will be followed up using University of Hawaii Cancer Research Center resources, and their data included in later articles about the project.

Of those participants enrolled at the time of this report, over 90% of participants used at least one CAM therapy, averaging 3.5 (SD=2.9) different types of CAM at T1 and 3.8 (SD=2.6) at T2. Thirty-five percent of participants reached suggested cut-offs for worse psychological functioning on one or more scales. Cross-sectional and repeated measures analysis found no effect for anxiety or depression at T1 and T2 on CAM use at either time point. Rather, coping response, specifically anxious preoccupation, as well as age and single marital status emerged as significant predictors of CAM use.

In multiple regression analysis exploring CAM use as a predictor of later emotional distress, earlier CAM use predicted later anxiety and depression, with the effect varying by type of CAM used. Specifically, greater use at T1 of alternative medical systems predicted significantly worse anxiety and depression scores at T2. In contrast, greater use at T1 of biologically-based treatments predicted significantly better anxiety and depression scores at T2. Greater use at T1 of energy therapies also predicted significantly worse anxiety scores but not depression scores at T2. While not significant, greater use at

T1 of mind-body therapies approached significance as a predictor of less anxiety but not depression at T2.

Key Research Accomplishments
- Data collection of T1 and T2 accomplished
- Data analysis of T1 and T2 accomplished
- Attended professional conferences and meetings promoting the study
- Included undergraduate students on research team
- Manuscript preparation underway for journal article based on research.

Reportable Outcomes
- Trainee successfully defended dissertation of research conducted as result of award.
- Award accomplishments enhanced application for position as pre-doctoral clinical psychology intern in health psychology at University of Florida.

Conclusions
In conclusion, during this phase of the project, the research team reported on data from 71 women newly diagnosed with breast cancer at the first data collection period. Forty of those women reached the second data point for the study. These data were analysed and comprised the dissertation for Ms. Shumay, successfully defended May 2004. Enrolled participants continue to provide data for this longitudinal study which is now supported by the University of Hawaii. The award has supported a quality training experience for Ms. Shumay and has supported her to continue to make satisfactory progress on her PhD degree and provided training making her eligible for a clinical internship at the University of Florida. The results of the study contradict and expand on previous research looking at emotional distress as a predictor of CAM use. Further studies should focus on possible causal factors influencing psychological outcomes correlated with different kinds CAM therapies.

Appendices

A LONGITUDINAL STUDY OF EMOTIONAL DISTRESS AND THE USE OF

COMPLEMENTARY AND ALTERNATIVE MEDICINE IN WOMEN WITH

BREAST CANCER

A DISSERTATION SUBMITTED TO THE GRADUATE DIVISION OF THE
UNIVERSITY OF HAWAI'I IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

IN

PSYCHOLOGY

MAY 2004

By
Dianne M. Shumay

Dissertation Committee:

Elaine M. Heiby, Chairperson
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Karl Minke
Gertraud Maskarinec

We certify that we have read this dissertation and that, in our opinion, it is satisfactory in scope and quality as a dissertation for the degree of Doctor of Philosophy in Psychology.

DISSERTATION COMMITTEE

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Chairperson

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ACKNOWLEDGMENTS

ABSTRACT

This longitudinal study explored emotional distress, coping response and complementary and alternative medicine (CAM) use at two time points early after diagnosis with breast cancer. Participants were women of Caucasian, Native Hawaiian, Japanese, and other Asian (Chinese, Filipino and Korean) ethnicities living in Hawaii and recruited through two breast cancer clinics and the American Cancer Society. Self-report questionnaires included the State-Trait Anxiety Inventory, the Center for Epidemiological Study Depression Scale, the Mental Adjustment to Cancer scale, a measure of CAM use designed for the study, and questions about demographics and treatment history. Seventy-one women completed the survey at T1 (on average 3 months post-diagnosis) and 40 women completed the follow-up survey at T2 (9 months post-diagnosis). Over 90% of participants used at least one CAM therapy, averaging 3.5 (SD=2.9) different types of CAM at T1 and 3.8 (SD=2.6) at T2. Thirty-five percent of participants reached suggested cut-offs for worse psychological functioning on one or more scales. Cross-sectional and repeated measures analysis found no effect for anxiety or depression at T1 and T2 on CAM use at either time point. Rather, coping response, specifically anxious preoccupation, as well as age and single marital status emerged as significant predictors of CAM use. In multiple regression analysis exploring CAM use as a predictor of later emotional distress, earlier CAM use predicted later anxiety and depression, with the effect varying by type of CAM used. Specifically, greater use at T1 of alternative medical systems predicted significantly worse anxiety and depression scores at T2. In contrast, greater use at T1 of biologically-based treatments predicted significantly better anxiety and depression scores at T2. Greater use at T1 of energy therapies also predicted

significantly worse anxiety scores but not depression scores at T2. While not significant, greater use at T1 of mind-body therapies approached significance as a predictor of less anxiety but not depression at T2. The results contradict and expand on previous research looking at emotional distress as a predictor of CAM use. Further studies should focus on possible causal factors influencing psychological outcomes correlated with different kinds CAM therapies.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

Breast cancer affects over 200,000 women annually in the U.S. and despite improvements in detection and treatment, it is a distressing, painful, disfiguring and often fatal disease (Jemal, Thomas, Murray, & Thun, 2002). When faced with a breast cancer diagnosis, many women experience mild to severe emotional distress including depression and anxiety (Epping-Jordan et al., 1999). In addition to depression and anxiety, women often experience post-traumatic symptoms, such as avoidance and intrusive thoughts, in response to their breast cancer diagnosis (Cordova et al., 1995). Although often declining in intensity, emotional distress also occurs later along the disease trajectory as women deal with the uncertainties and side effects of treatment, possible death, concerns about family (especially children), role uncertainty, post-surgical body image and sexual functioning, worries about cancer recurrence and other concerns (Kornblith, 1998; Payne, Sullivan, & Massie, 1996; Shapiro et al., 2001).The degree to which women experience emotional distress appears to be moderated by mental adjustment to cancer coping response. Women who take a passive, helpless/hopeless, fatalistic or pessimistic approach are more likely to experience depression or anxiety (Burgess, Morris, & Pettingale, 1988; Epping-Jordan et al., 1999).

Emotional distress has emerged as a predictor of complementary and alternative medicine (CAM) use among women with breast cancer (Burstein, Gelber, Guadagnoli, & Weeks, 1999; Carlsson, Arman, Backman, & Hamrin, 2001). Active problem-focused coping (Sollner et al., 2000) and anxious preoccupation (Carlsson et al.) have also been related to CAM use by cancer patients. The purpose of this longitudinal study was to examine the relationship among socio-demographic and treatment variables, emotional

distress, coping response and degree of CAM use in breast cancer patients at two time points, early after diagnosis (0-6 months) and later (9 months) post-diagnosis. This study also explored the types of CAM used by women with higher levels of anxiety and depression, as patients may use CAM for relief from the symptoms of emotional distress.

A review of emotional distress, trauma symptoms, mental adjustment to cancer coping response and CAM use in breast cancer patients follows.

Emotional Distress

Emotional distress, including depression and anxiety, has long been understood as a common reaction to breast cancer diagnosis and treatment (Fallowfield, Hall, Maguire, & Baum, 1990). Rates of prevalence of clinically significant depressive symptoms have been estimated at 31% in all cancer patients (Dugan et al., 1998) and 34% in those with breast cancer (Epping-Jordan et al., 1999). Similarly, anxiety symptoms were present in 27% to 42% of breast cancer cases depending on time of assessment in a prospective study (Fallowfield et al.). In general, it appears that emotional distress is greater immediately after diagnosis and declines over the disease trajectory (Burstein et al., 1999; Cimprich, 1999; Grassi & Rosti, 1996). However, a meta-analysis of 58 studies found a significant decrease for anxiety but not depression over the course of the disease (van't Spijker, Trijsburg, & Duivenvoorden, 1997). In one study, 38% of breast cancer patients were depressed at a follow-up visit after chemotherapy had ended (Morasso et al., 2001). Women with poorer emotional functioning pre- or post- diagnosis with breast cancer continued to exhibit poorer functioning when assessed later on in the course of their

disease (Ell, Nishimoto, Morvay, Mantell, & Hamovitch, 1989; Maunsell, Brisson, & Deschenes, 1992).

Younger women, and individuals with more severe breast cancer, more physical limitations and more symptoms, including lymphedema, were more likely to experience emotional distress (Badger, Braden, & Mishel, 2001; Epping-Jordan et al., 1999; Passik & McDonald, 1998; van't Spijker et al., 1997; Vinokur, Threatt, Caplan, & Zimmerman, 1989; Walker, 1998). In addition, women with breast cancer were more likely to experience emotional distress when they exhibited a passive, helpless/hopeless, fatalistic or pessimistic coping style (Burgess et al., 1988; Epping-Jordan et al.; van't Spijker et al.).

Trauma Symptoms

The diagnosis of cancer can be a traumatizing event, especially due to the life-threatening nature of the diagnosis, for some leading to acute and post-traumatic stress symptoms, including intrusive thoughts and avoidance. Rates of clinically-significant post-traumatic stress symptoms range from 5-26% in women with breast cancer (Cordova et al., 1995; Koopman et al., 2002; Tjemsland, Soreide, & Malt, 1998). In a longitudinal study, between 14-18% of women with breast cancer reported high levels of post-traumatic symptoms at 6 weeks after surgery. A year after the surgery, a subgroup of women continued to report high levels of intrusive and avoidance symptoms (9% and 10%, respectively) and 12% met diagnostic criteria for PTSD (Tjemsland et al.). In another longitudinal study following 117 women with breast cancer, Koopman et al. found traumatic stress symptoms to be correlated with post-surgical treatment, and lower

emotional self-efficacy at baseline, and with younger age and the impact of the illness at later assessment. Disease stage, time since treatment completion, number of pre-cancer traumatic stressors and social support were predictive of cancer-related post-traumatic stress symptoms in another study of 82 women with breast cancer (Andrykowski & Cordova, 1998).

Coping Response

Greer and Watson (Greer, Morris, & Pettingale, 1979; Watson, Greer, Blake, & Shrapnell, 1984) originally described the coping styles exhibited by cancer patients (denial, fighting spirit, stoic acceptance, helplessness/hopelessness) that led to the formation of the Mental Adjustment to Cancer Scale (MAC) and its subscales: Fighting Spirit, Helplessness/hopelessness, anxious preoccupation, and Fatalism. (Watson et al., 1988; Watson, Haviland, Greer, Davidson, & Bliss, 1999). *Fighting spirit* is the response that cancer patients have when they accept their diagnosis but remain optimistic and vow to fight the disease. *Helplessness/ hopelessness* is the response to cancer characterized by pessimism and giving up. *Anxious preoccupation* is characterized by a constant vigilance with bodily symptoms and fears about cancer spread and recurrence. *Fatalism* or stoic acceptance is the response by patients in which they fully accept the reality of their cancer but with resignation and a sense of futility.

MAC coping response style has been shown to be related to degree of emotional distress in breast cancer and other cancer patients. Fighting spirit predicted better psychological functioning, and helplessness/hopelessness predicted worse psychological functioning across studies (Akechi, Okamura, Yamawaki, & Uchitomi, 1998; Grassi et

al., 1996; Lampic et al., 1994; Sherliker & Steptoe, 2000; van't Spijker et al., 1997; Watson et al., 1991). Fatalism also predicted worse emotional functioning (Grassi et al., 1996; Lampic et al., 1994; van't Spijker et al., 1997; Watson et al., 1991). Lastly, anxious preoccupation was positively correlated with psychological wellbeing in patients with advanced cancer (Sherliker & Steptoe), but it was predictive of worse psychological functioning in other studies (Grassi et al.; Lampic et al.; van't Spijker et al.; Watson et al.).

Complementary and Alternative Medicine

The National Institutes of Health National Center for Complementary and Alternative Medicine (NCCAM) defines CAM as "those healthcare and medical practices that are not currently an integral part of conventional medicine" (NCCAM, 2004). To further define CAM and set a standard for classification for the many individual types of CAM therapies, NCCAM has designated a list of 5 domains of CAM: (1) *alternative medical systems*, such as acupuncture, homeopathy or naturopathy; (2) *mind-body interventions*, such as relaxation, prayer or meditation; (3) *biologically-based treatments*, such as vitamins, supplements, herbs or special diets; (4) manipulative and body-based methods, such as chiropractic or massage therapy; and (5) energy therapies, such as healing touch or tai chi (NCCAM). Cancer patients in Hawaii have reported the use of a variety of CAM treatments, the most popular of which include herbs and supplements, vitamins and minerals, religious/spiritual healing, special diets, meditation techniques, massage, guided imagery, support groups, acupuncture, healing touch, yoga, naturopathy, Native Hawaiian healing, and homeopathy (Gotay, Hara, Issell, & Maskarinec, 1999;

Maskarinec, Shumay, Kakai, & Gotay, 2000; Shumay, Maskarinec, Gotay, Heiby, & Kakai, 2002).

CAM use is very common among breast cancer patients and has appeared to increase over time (Lengacher et al., 2002). The most recent studies show high rates of CAM use among breast cancer patients ranging from 66% (Henderson & Donatelle, 2003), to 87% (Patterson et al., 2002). Less recent studies in Hawaii, show prevalence rates below this range for CAM use by breast cancer patients. Gotay and colleagues (1999) in a study of 367 cancer patients in Hawai'i (the majority of whom were of Asian and Pacific Islander origin) found that overall 36% of participants reported CAM use, with 42% of breast cancer patients reporting use. In a study with 1,168 cancer survivors in Hawaii, 39% of those with breast cancer (n=313) reported CAM use after cancer diagnosis, compared to 25% for all types of cancer (Maskarinec et al., 2000). Factors predicting CAM use in women with breast cancer include: younger age, use of CAM before diagnosis, higher education, support group attendance and Caucasian ethnicity (Adler, 1999; Balneaves, Kristjanson, & Tataryn, 1999; Boon et al., 2000; Crocetti et al., 1998; Lee, Lin, Wrensch, Adler, & Eisenberg, 2000; Rees et al., 2000). Most cancer patients who use CAM do so in conjunction with conventional biomedical treatment (Cassileth, Lusk, Strouse, & Bodenheimer, 1984; Lerner & Kennedy, 1992; Sollner et al., 2000).

Several studies have found an association between emotional distress and CAM use in community and general cancer samples. In a large national telephone survey (n=9,585), the use of CAM was significantly related to anxiety and depressive disorders (Unutzer et al., 2000). In a study of cancer patients, greater anxiety but not depression

was associated with CAM use (Downer et al., 1994). Among Hawaii cancer survivors, significantly poorer emotional functioning on a quality of life scale was related to CAM use (Maskarinec et al., 2000). In contrast, in a survey of cancer patients, pain patients and a community sample, positive affect and hypnotizability were correlated with the number of CAMs used, while negative affect was not correlated with CAM use (Owens, Taylor, & Degood, 1999). A study of German cancer patients undergoing radiation also failed to find a relationship between emotional distress and CAM use. CAM use was better predicted by active coping behavior, such as information-seeking and problem-solving. In that study, the authors excluded types of CAM that could be considered psychological therapies, such as relaxation and self-help groups (Sollner et al., 2000).

Among breast cancer patients, CAM users reported using CAM for psychological support (Crocetti et al., 1998; Gotay et al., 1999), and having received psychological counseling was a strong predictor of CAM use (Lee et al., 2000). Furthermore, in a longitudinal study of women with breast cancer, investigators found elevated scores on a measure of psychological distress to be strongly related to the adoption of CAM use after diagnosis (Burstein et al., 1999). Recently, in a cohort study comparing 60 Swedish women who entered a complementary medicine clinic with 60 matched controls who used only conventional treatment for breast cancer, the CAM group was more likely to report lower quality of life, including poorer emotional functioning. This group also tended to exhibit an anxious preoccupation coping style (Carlsson et al., 2001). In a study of Austrian breast cancer patients, the women who had an active problem-oriented coping style were more likely to be CAM users, while a subgroup of heavy CAM users reported worse emotional functioning and more depressive coping styles than light users or

nonusers of CAM (Moschen et al., 2001). Likewise, women who used CAM in a study of breast cancer patients in Montreal were more likely to use adaptive problem-solving coping and less escape/avoidance coping than nonusers. CAM users were also more likely to report anger, confusion and fatigue than nonusers (Edgar, Remmer, Rosberger, & Fournier, 2000).

A number of studies have reported that cancer patients perceive CAM to be of psychological benefit. In one study, 63% of cancer patients who used CAM reported perceived psychological benefits, such as increased sense of control, feeling calmer and improved coping with their illness as a result of CAM use (Miller et al., 1998). In a study with cancer patients and pain patients, greater improvement in psychological well-being was associated with the number of CAM therapies used (Owens et al., 1999). Cancer patients, including those with breast cancer, have stated that they seek out CAM because they expect psychological benefit (i.e., as a source of hope, to increase sense of control, to reduce stress, to strengthen psychological resources for healing and coping with cancer and to improve quality of life; (Gotay et al., 1999; Salmenpera, Suominen, Lauri, & Puukka, 2001; Weis et al., 1998; Yates et al., 1993).

Purpose and Hypothesis

This study examined the extent to which levels of depression and anxiety and coping response at approximately 0-6 months (T1) and nine months (T2) post-diagnosis were related to CAM use at T1 and T2. The model for this analysis is loosely based on Andersen's healthcare utilization model in which predisposing, maintaining and enabling factors are theorized to predict the use of health services (Andersen, 1973; 1995). Figure

1 depicts a model in which three categories of variables are expected to predict greater degree of CAM use among women with breast cancer. First, greater emotional distress, defined as greater levels of depression and anxiety, will be related to more CAM use. Next, the coping response styles anxious preoccupation and fighting spirit are expected to have a positive effect on CAM use, while fatalism and helplessness/hopelessness would be expected to have a negative effect. Lastly, a number of socio-demographic and clinical variables are also expected to predict greater CAM use: younger age, higher income, higher education level, being married, Caucasian ethnicity and receiving chemotherapy.

Figure 2 depicts a more complex model in which the variable categories are shown to be inter-related. This model is based upon Kornblith's (1998) vulnerability model of psychosocial adaptation of cancer survivors with the addition of CAM use as an outcome as well as a mediating variable. In this model, breast cancer and treatment are seen as the precipitating events that ultimately lead to psychosocial adaptation and CAM use. Sociodemographic and coping responses are viewed as mediating variables in that they represent the presence or absence of resources that lead to better or worse adaptation.

The longitudinal nature of this study allowed us to explore hypothesized temporal relationships between the variables. First, greater emotional distress at T1 was expected to predict greater degree of CAM use at T2, in so much as patients would be expected to use CAM in response to depression or anxiety; while greater degree of CAM use at T1 was expected to predict less emotional distress at T2 due to the possible psychological benefits of using CAM. We also expected that the types of CAM sought after by women

with higher levels of anxiety and depression would be those that are categorized in the

Mind Body Interventions domain as defined by NCCAM (2004).

Level of Emotional Distress

Depression

Anxiety

Reaction to Cancer

Anxious preoccupation

Hopelessness/helplessness

Fighting spirit

Fatalism

Degree of CAM Use

+   +

+

-

+

-

Sociodemographic & Clinical Variables

Age

Income

Education level

Marital Status (married)

Ethnicity (Caucasian)

Cancer Treatment (chemotherapy)

-

+

+

+

+

+
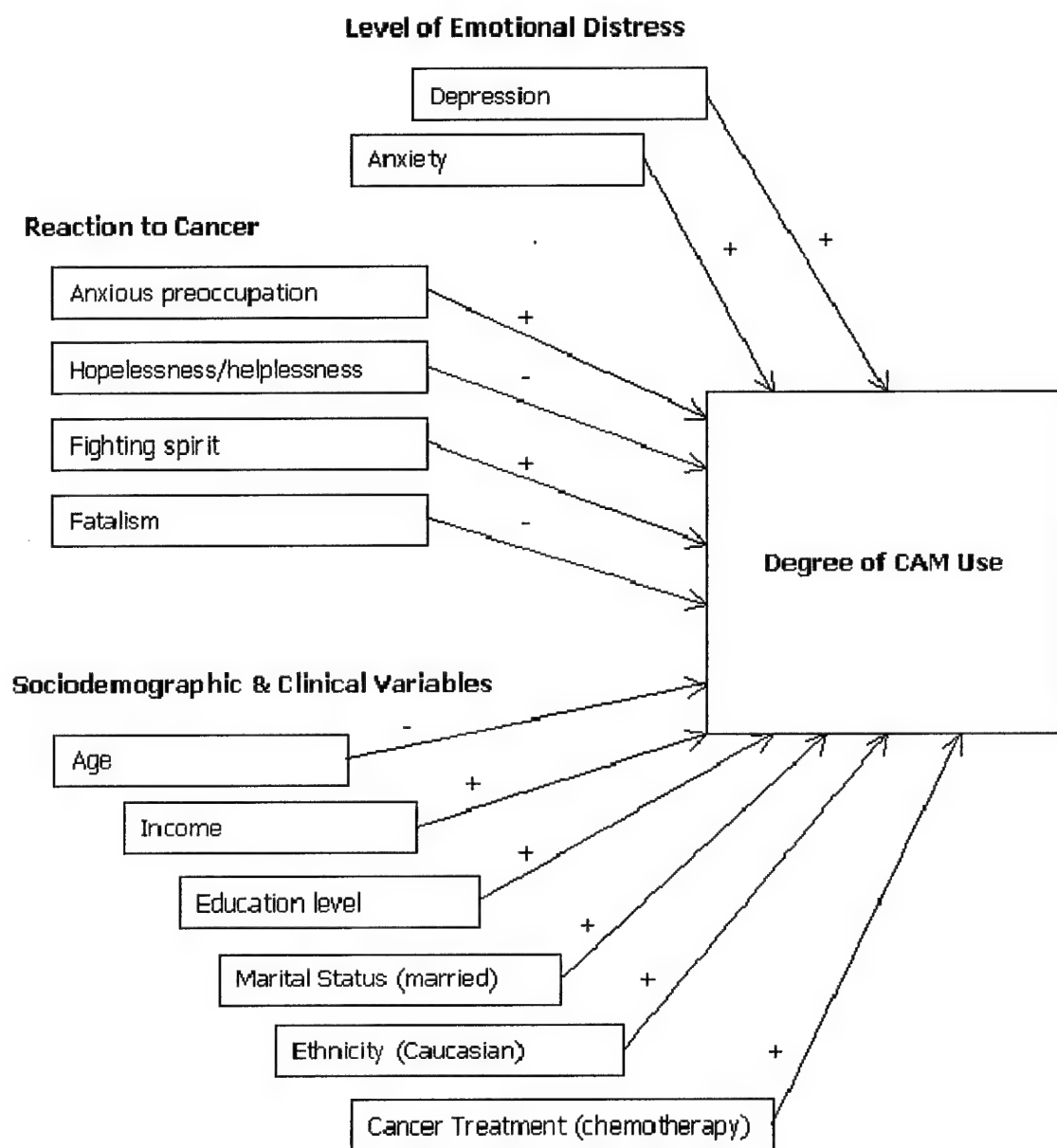
Figure 1. Hypothetical model of determinants of degree of CAM use by women with breast cancer.

Stressful Event

Breast
Cancer

Mediating
Variables
(Resources)

Adaptation

Education
Income
Social support
Cultural factors
Coping Response

Emotional
Distress

CAM
Use

Disease
Severity

Cancer
Treatment

CAM as Intervention
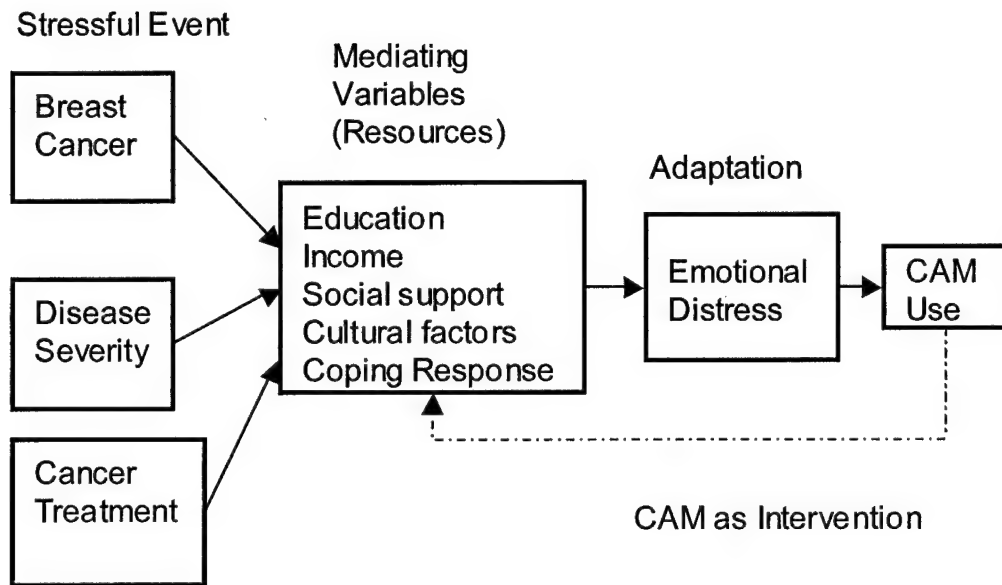
Figure 2. Vulnerability model of psychosocial adaptation with CAM utilization
(adapted from Kornblith, 1998).

METHOD

Participants

Three local and one national institutional review boards overseeing the protection of human subjects approved the research protocol. Adult, female residents of Hawai'i who were diagnosed in the previous 6 months with *in situ* or invasive breast cancer were eligible for the study.

We recruited participants via three main venues: a high volume breast cancer surgery practice, an HMO cancer clinic and the Hawaii branch of the American Cancer Society. The breast cancer surgeon sent our study brochure with a letter inviting participation to all eligible patients over a 9-month period (*n*=126; response rate = 22.2%). The staff of the HMO cancer clinic presented our study brochure as part of an information packet given to all eligible patients during a one-year period (*n*=96; response rate = 5.2%). And, the American Cancer Society sent our brochure to all eligible Reach to Recovery program participants over a one-year period (*n*=62; response rate = 64.0%). We gained an additional 6 participants through word of mouth and radio and print advertising.

A total of 284 brochures were mailed or given directly to eligible women by their medical providers, we received 90 response cards, telephone and email inquiries, 9 women were eliminated for failure to meet study eligibility criteria and 81 questionnaires were sent out. A total of 71 women completed the T1 (0-6 months post-diagnosis) questionnaire. Two participants returned the T1 questionnaire after reminder cards were sent. A total of 50 participant women became eligible for the T2 (9 months post-

diagnosis) survey during the study period. Of those, 40 returned the completed survey (completion rate = 80%).

Sources of Data

1) <u>The Center for Epidemiological Studies Depression Scale</u> (CESD; Radloff, 1977) is a widely used 20-item instrument for measuring depressive symptoms in the general clinical population. Respondents rate the frequency of a particular thought or behavior occurring over the past week on a four-option Likert-type scale ranging from "rarely" to "most of the time." A psychometric analysis with a sample of breast cancer patients found the instrument to perform with excellent reliability (internal consistency: coefficient alpha >0.85) and demonstrated construct validity (Hann, Winter, & Jacobsen, 1999). Across clinical populations, the scale correlated well with criterion validity measures including clinical interviews and was sufficiently sensitive to detect changes in depressive symptoms over time (Weissman, Sholomskas, Pottenger, Prusoff, & Locke, 1977). Devins and colleagues (1988) reported the psychometric properties of the CESD in populations with illness and found a cut-off of >16 to show high sensitivity and specificity.

2) <u>State-Trait Anxiety Inventory</u> (STAI; Spielberger, Gorsuch, & Lushene, 1970) is a well-validated scale measuring both the more stable trait anxiety as well as variations in anxiety states and is thus useful for repeated measures analysis. The instrument has been used in thousands of studies across many clinical populations including studies of psychosocial aspects of breast cancer (Fallowfield et al., 1990).

3) <u>The Mental Adjustment to Cancer Scale</u> (MAC; Watson et al., 1988) is a 40-item instrument designed to measure adjustment and coping style with four subscales: Fighting Spirit; Helplessness/Hopelessness, Anxious Preoccupation, and Fatalism. The instrument received construct validity support and showed moderate to high internal consistency across the four subscales (Cronbach's α = 0.64 - 0.85) in a study with breast cancer patients (Osborne, Elsworth, Kissane, Burke, & Hopper, 1999).

4) <u>The Impact of Event Scale</u> (IES; Horowitz, Wilner, & Alvarez, 1979) is a 15-item self-report questionnaire designed to assess individuals who have had a recent traumatic life event. In this case, the "event" was "being diagnosed with cancer," and respondents were asked to endorse items on a 4-point Likert-type scale according to the frequency of symptoms within the previous week. The scale is intended to address the two aspects of Horowitz' theory of traumatic stress, avoidance and intrusive thoughts, and generates two corresponding subscale scores and a total score. Internal reliability reported in previous studies was sufficiently high for the subscales as well as the total score (Cronbach's α = 0.78 - 0.86; (Horowitz et al.; Zilberg, Weiss, & Horowitz, 1982). Higher scores denote greater distress symptoms, and a cutoff score of 35 for the total score demonstrated optimal positive predictive value and a low false positive rate (Neal et al., 1994). The IES has been used in a number of studies to measure traumatic symptoms after breast cancer (e.g., Koopman et al., 2002; Tjemsland et al., 1998).

5) <u>Health Therapies Questionnaire</u> (Appendix A) is a two-page questionnaire to assess CAM use designed for this study. The questionnaire is based on the self-report items on CAM use including a checklist of 22 CAM types from the questionnaire we used

in our previous study (Maskarinec et al., 2000) as well as questionnaires used by others in studying CAM with cancer patients (e.g., Gotay et al., 1999; Miller et al., 1998). We further adapted the list from a content analysis of cancer patient interviews in which participants described the types of CAM they used (Shumay et al., 2002). We also amended the response options to include a Likert-type scale to rate the degree to which respondents regularly engage in the therapy to provide an additional dimension of the degree of CAM use as suggested by our previous study (Shumay et al.).

6) <u>Background and Treatment History Questionnaire</u> (Appendix B) is a two-page questionnaire designed for this study. The instrument uses self report items to gather information about participants' demographics, stage and other disease characteristics, medical treatments for cancer, and previous and current treatment for anxiety, depression and other mental disorders.

Procedure

Interested women who received our brochure, read our advertisements or otherwise became acquainted with the study contacted us via mail, email or telephone. In most cases we then attempted to contact the women by telephone to explain the study, verify eligibility and inform them that study materials would arrive by mail. For those that we were unable to reach, we sent the study materials to the address they had provided. We sent each participant an envelope that included a cover letter outlining the study procedures, two copies of the informed consent form, a questionnaire packet, a

stamped return envelope and a pen. We instructed participants to read and return one signed copy of the informed consent form along with the questionnaire.

Participants who returned the first completed questionnaire (T1) and consent form were sent a second packet of questionnaires with a cover letter at 9 months post-diagnosis (T2). The questionnaires at T2 were identical to those at T1 except we omitted the demographic questions on the background questionnaire. Those that did not return the questionnaires were sent reminder cards two weeks and four weeks after the initial mailing.

Analysis

All analyses were conducted using the SAS statistical analysis software (SAS Institute Inc., 1991). Where multiple comparisons of means were undertaken, we employed a Bonferroni adjustment. Descriptive statistics were used to summarize results from T1 and T2 for the participants' age, ethnicity, marital status, income, education level, stage at diagnosis, biomedical cancer treatments received to date and within one month preceding the survey and biomedical cancer treatments declined. We compared T2 non-responders to responders on key demographic and disease and treatment characteristics at baseline. We also described participants by scores on the CESD, STAIS, IES and MAC subscales, reported the number of participants that met suggested cutoffs for the scales, and compared the results to published norms.

To derive participant CAM scores, we added all the individual CAM types used on the Health Therapies Questionnaire to generate the total CAM used at the time of the survey, total CAM ever used and total CAM begun after cancer diagnosis. We did not

include support group use and exercise in this variable, as they are routinely recommended by health care teams and thus no longer meet the definition of CAM (NCCAM, 2004). We calculated participant's frequency of CAM use by adding the scores for regularity of use for each type of CAM used at the time of the survey. To generate an average CAM satisfaction score for each participant, we added the participant's satisfaction ratings and then divided by the number of CAMs used. We then reported means, standard deviations and ranges for all CAM variables. We also ranked CAM types by number of users across T1 and T2 and by ethnicity category. We categorized CAMs by NCCAM domain: (1) alternative medical systems (ALT), (2) mind-body interventions (MB), (3) biologically-based treatments (BIO), (4) manipulative and body-based methods (MAN), and (5) energy therapies (NCCAM, 2004). We calculated correlation coefficients at T1 and T2 among measures of CAM use and NCCAM domain use derived from the questionnaires.

We divided the participants into *Cases* versus *Noncases*. Cases were those that met criteria by scoring above the suggested cutoff on one of the following scales: STAIS, CESD, IES total score, HH and AP. For the STAIS, a participant met the cut-off if she scored more than one standard deviation above the mean for published norms of healthy females in 50-59 age category (cutoff > 49; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). For the CESD, Devins et al (Devins et al.) suggested a cutoff of >16 for significant levels of depressive symptoms. For the IES total score, we used a score of 35 or higher as suggested by Neal et al. (1994). For the Mental Adjustment to Cancer subscales, Watson et al. (Greer, Moorey, & Watson, 1989; Watson, Greer, & Bliss, 1989) suggested a cutoff of >11 as a case for HH and >25 as a case for AP. HH and AP are two

subscales that are associated with poorer emotional functioning (Lampic et al., 1994). We compared these cases to the rest of the participants to see if they differed on CAM use, types of CAM used and NCCAM domain (*t* test).

We compared continuous variables for the 40 participants who completed questionnaires at both T1 and T2 to see if there was a change over time (*t* test). We also looked at correlation coefficients among the main variables and univariate analyses to determine relationships among key predictor variables and between predictor variables and total CAMs used.

To address our main research question, namely does level of emotional distress (ie. anxiety and depression) predict CAM use at T1 and T2, we employed a multilevel modeling analysis. Because there were repeated measurements taken, the observations were not independent. This necessitated the need to employ multilevel modeling procedures. Specifically, observations from one participant are likely to be more similar than observations across participants; and because standard statistical tests require that the assumption of independence of observations be met, these traditional methods could not be used here. If they were, then the estimates of the standard errors could be too small, and the results could be spurious. However, through multilevel modeling, the total variance can be partitioned into that from the observation level (Level 1) and that from the participant level (Level 2). Hence, the problem of spurious standard errors is addressed. Detailed information on multilevel modeling can be found in several textbooks (Goldstein, 1995; Hox, 2002; Raudenbush & Bryk, 2002). Another benefit of the multilevel modeling design is that the observed data do not need to be balanced (i.e., measurement occasions do not need to be the same for each individual). In this study, the

measurements do not conform to a balanced design. Time of measurement is not consistent across participants, and some participants are measured on only one occasion, further necessitating the need for the multilevel procedure.

We used multiple regression analysis to address our second research question, namely does CAM use at T1 predict anxiety and depression at T2. Controlling for age and stage, which we hypothesized, may account for some of the variance in our emotional distress variables, we included total CAM used at T1 by NCCAM category (alternative medical systems, mind body interventions, manipulative and body-based therapies, biologically-based treatments and energy therapies) as predictor variables.

To further explore the variables suggested by our theoretical model, we also used cross-sectional hierarchical multiple regression for T1 and for T2 to explore theoretical groupings of variables based upon our model of predictors of total CAM used: sociodemographic and clinical variables, reaction to cancer, and emotional distress (i.e. depression, anxiety). We included variables that were significant at the $p<.05$ level in the univariate analysis in Step 1 and Step 2 and scores on the CESD and STAIS in Step 3. We compared incremental differences in R^2 for each step using an F test (Hatcher & Stepanski, 1999).

RESULTS

Characteristics of Participants

Table 1 shows demographic information and Table 2 shows disease and treatment information for the 71 participants at T1 (baseline) and 40 participants at T2 (followup). There was no significant difference in demographic characteristics, disease stage or cancer treatment between those that completed T2 and those that completed only T1, but there was a trend toward older women and those who had had mastectomy as more likely to complete T2. Participants completed the T1 survey at a mean of 3.6 months (SD=1.47) post diagnosis, and participants completed the T2 survey at a mean of 9.4 months (SD=0.53) post-diagnosis. Comparing T1 to T2 among participants who completed both surveys, participants were significantly less likely to have undergone surgery within the month preceding T2 and significantly more likely to be taking tamoxifen or other hormonal treatment for breast cancer.

Over 1995-2000 in Hawaii, 28% of women with invasive breast cancer were Caucasian, 16% Hawaiian, 33% Japanese and 19% other Asian (American Cancer Society, 2003). Comparatively, our sample contained slightly more Caucasian and Hawaiian women and slightly fewer Japanese women. Looking at stage of disease, 71% of our sample were women diagnosed with stage 1 or stage 2 disease (including in situ) compared to 69% having early staged (localized disease excluding in situ) for all women diagnosed in Hawaii from 1995-2000 (American Cancer Society). The women in our sample tended to be younger than the greater population of Hawaii breast cancer patients. Forty-six percent of those who completed T1 and 37% of those who completed T2 were

under age 55 at diagnosis compared to 36% under 55 for all Hawaii women with breast

cancer (American Cancer Society).

Table 1. Demographic Characteristics of Participants

		T1 (n=71)		T2 (n=40)		t
Age	Mean	55.96		58.90		2.15*
	(SD)	(11.30)		(10.31)		
	Range	33.34-85.23		35.63-85.63		
		n	%	n	%	χ^2
Ethnicity	Caucasian	27	38.03	12	30.0	3.92
	Hawaiian	16	22.54	9	22.5	
	Japanese	15	21.13	11	27.5	
	Other Asian	11	15.49	7	17.5	
	Other/Unknown	2	2.82	1	2.5	
Marital Status	Married/Partnered	48	67.61	29	72.5	1.00
	Single/div/wid	21	29.58	10	25.0	
	Unknown	2	2.82	1	2.5	
Family Income	<$25,000	10	14.08	6	15.0	0.79
	$25-$50,000	13	18.31	7	17.5	
	>$50-$100,000	25	35.21	13	32.5	
	>$100,000	16	22.54	10	25.0	
	Unknown	7	9.90	4	10.0	
Education	High School	12	16.90	6	15.0	2.02
	College	28	39.44	14	35.0	
	Grad/Prof School	30	42.25	19	47.5	
	Unknown	1	1.41	1	2.5	

Note. div=divorced; wid=widowed; grad=graduate; prof=professional.
Test compares participants who completed both T1 and T2 (n=40) with participants who completed only T1 (n=31) on values at T1. All tests χ^2 except *Age* (*t* test).
* $p < .05$, but not significant after Bonferroni adjustment ($p<.002$).

Table 2. Disease and Treatment Characteristics of Participants

		T1		T2		
		n	*%*	*n*	*%*	χ^2
Months since diagnosis	Mean		3.57		9.38	
	(SD)		*(1.47)*		*(0.53)*	
	Range		0.68-5.77		8.47-10.67	
Stage	1	34	*47.89*	19	*47.5*	3.03
	2	17	*23.94*	9	*22.5*	
	3	6	*8.45*	4	*10.0*	
	4	2	*2.82*	3	*7.5*	
	Unknown	12	*16.90*	5	*12.5*	
Treatment received	Mastectomy	23	*32.39*	18	*45.0*	4.27*
	Lumpectomy	56	*78.87*	29	*72.5*	0.83
	Chemotherapy	22	*30.99*	18	*45.0*	0.10
	Radiation	30	*42.25*	22	*55.0*	0.85
	Hormonal	16	*22.54*	17	*42.5*	1.33
	None to date	2	*2.82*	0	*0.0*	
Current treatment[a]	Surgery	25	*35.21*	3	*7.5*	10.42**
	Chemotherapy	17	*23.94*	5	*12.5*	2.11
	Radiation	17	*23.94*	6	*15.0*	1.25
	Hormonal	13	*18.31*	18	*45.0*	9.06**
	None currently	12	*16.90*	12	*30.0*	1.15
Declined treatment[b]	At least one	17	*23.94*	5	*12.5*	2.11
	Masectomy	3	*4.22*	0	*0.0*	
	Lumpectomy	3	*4.22*	0	*0.0*	
	Sampling nodes	1	*1.40*	0	*0.0*	
	Chemotherapy	7	*9.86*	3	*7.5*	
	Radiation	5	*7.04*	1	*2.5*	
	Hormonal	3	*4.23*	2	*5.0*	

Note. Fischer exact χ^2 test compares participants who completed both T1 and T2 with participants who completed only T1 (*n*=31) on values at T1 for *Stage* and *Treatment Received*. *Current treatment* and *Declined treatment* compares participants who completed both T1 and T2 (*n*=40).
* $p<.05$; ** significant after Bonferroni adjustment ($p<.002$).
[a]Treatment in the month preceding survey.
[b]Participants reported declining some recommended cancer treatment.

CAM Use by Participants

Participants used an average of 3.5 (*SD*=2.87) CAM therapies at T1 and 3.9

SD=2.62) at T2. Sixty-four (or 90%) of participants were using CAM at the time of

survey at T1 and 92.5% were using CAM at T2 (Table 3). All but one current CAM user

started at least one CAM (up to 13 CAM types) after breast cancer diagnosis. CAM users

tended to be slightly more satisfied than neutral with the types of CAM they used. The

mean of the average CAM satisfaction rating was 4.87 (*SD*=2.34) out of a possible 7 at

T1 and 5.15 (*SD*=2.19) at T2. Assignment of individual CAM therapies into NCCAM

domains resulted in an average of 2.4 (*SD*=1.3) domains per participant at T1 and 2.7

domains per participant (*SD*=1.21) at T2. (Table 3). Biologically-based therapies,

encompassing CAMs such as herbs or botanicals, other supplements, vitamins or

minerals and special diets, were used by the most participants, 52 out of 71 CAM users,

at T1. Manipulative or body-based techniques, such as chiropractic and massage

therapies, were used by the most participants at T2 (32 out of 40 participants) followed

closely by biologically-based therapies. Mind-body interventions were also important at

both T1 and T2. These CAMs include religious or spiritual healing, meditation, and

guided imagery. The least common domain at both T1 and T2 was alternative medical

systems.

Table 3. Means, Standard Deviations and Frequency of CAM Use

	T1				T2			
	Mean	*SD*	*n*	*%*	Mean	*SD*	*n*	*%*
Total CAM Use								
At survey	3.49	*2.87*	64	*90.1*	3.85	*2.62*	37	*92.5*
Range	0-13				0-10			
Ever used	6.51	*4.63*	69	*97.2*	7.33	*4.47*	38	*95.0*
Range	0-19				0-19			
Begun post-BC	0.86	*1.81*	63	*88.7*	1.08	*1.38*	24	*60.0*
Range	0-13				0-5			
CAM Use Reg[a]	18.3	*15.3*			19.03	13.26		
CAM Satisfaction[b]	4.87	*2.34*			5.15	2.19		
NCCAM Domains	2.42	*1.26*			2.67	1.21		
Alt Med Sys	0.17	*0.53*	8	*11.3*	0.15	*0.43*	5	*12.5*
Mind Body	1.24	*1.22*	47	*66.2*	1.43	*1.26*	28	*70.0*
Biological	1.55	*1.36*	52	*73.2*	1.63	*1.31*	31	*77.5*
Manipulative	0.94	*0.81*	50	*70.4*	1.13	*0.82*	32	*80.0*
Energy	0.24	*0.49*	15	*21.1*	0.28	*0.45*	11	*27.5*

Note. Mean=mean number of CAM types by variable; *n*=number of participants using; BC=breast cancer; Reg=regularity; NCCAM=National Center for Alternative and Complementary Medicine; Alt=Alternative; Med=Medicine; Sys=systems.
[a]Sums each participant's scores for regularity of CAM use (Likert scale; range 0-7).
[b]Averages each participant's scores for satisfaction for CAM (Likert scale; range 0-7).

As shown in Table 4, the most popular CAM types used by participants at T1 were vitamins, with many participants using more than one individual type within this broad category. (See Appendix C for a complete listing of vitamins used by participants.) Also popular with participants were religious or spiritual healing and prayer, other supplements (listed in Appendix C) and relaxation techniques. Table 5 shows frequency of CAM use by NCCAM domain and most popular CAM types across ethnicities.

Table 4. CAM Types Ranked by Number of Users

CAM Types	NCCAM Domain	T1 n	T1 %	T2 n	T2 %
Vitamins[a]	BIO	45	63.4	25	62.5
Religious healing/prayer	MB	40	56.3	22	55.0
Other supplements[a]	BIO	23	32.4	18	45.0
Relaxation techniques	MB	19	26.8	16	40.0
Herbs or botanicals[a]	BIO	17	23.9	7	17.5
Special diet[a]	BIO	14	19.7	9	22.5
Energy healing	ET	13	18.3	8	20.0
Massage/bodywork	MAN	12	16.9	9	22.5
Meditation	MB	11	15.5	8	20.0
Aromatherapy	BIO	11	15.5	6	15.0
Guided imagery	MB	10	14.1	6	15.0
Chiropractic	MAN	5	7.0	4	10.0
Yoga	MB	5	7.0	4	10.0
Acupuncture	ALT	4	5.6	2	5.0
Naturopathic	ALT	4	5.6	0	0.0
Tai chi or chi gong	ET	4	5.6	3	7.5
Homeopathy	ALT	3	4.2	3	7.5
Hypnosis/self-hypnosis	MB	3	4.2	1	2.5
Osteopathy	MAN	2	2.8	1	2.5
Other CAM[b]		2	2.8	1	2.5
Hawaiian healing	ALT	1	1.4	1	2.5

Note. Readers are directed to several available guides to CAM for explanations of CAM types listed here (e.g., (Cassileth, 1998); NCCAM=National Center for Complementary and Alternative Medicine; BIO=biologically-based treatments; MB= mind-body interventions; ET=energy therapies; MAN=manipulative and body-based methods; ALT=alternative medical systems.
[a]Participants used many different types of vitamins, other supplements, herbs, and diets. For a more complete listing, see Appendix C, Appendix D and Appendix E.
[b]For a complete listing, see Appendix F.

Table 5. Frequency of CAM Use, NCCAM Domain and Popular CAM Types by Ethnicity at T1

	Caucasian n=27		Native Hawaiian n=16		Japanese n=15		Other Asian n=11	
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*
CAM Use at Survey	24	*88.9*	16	*100*	14	*93.3*	9	*81.2*
Total CAM *M (SD)*	3.19 *(2.63)*		4.06 *(2.41)*		3.20 *(2.57)*		4.27*(4.34)*	
NCCAM Domain								
Alt Medicine Sys	2	*7.4*	3	*18.8*	0	*0*	3	*27.3*
Mind Body	18	*66.7*	14	*87.5*	8	*53.3*	6	*54.5*
Biological	18	*66.7*	14	*87.5*	13	*86.7*	7	*63.6*
Manipulative	19	*70.4*	11	*68.8*	11	*73.3*	8	*72.7*
Energy Therapies	7	*25.9*	4	*25.0*	3	*20.0*	1	*9.0*
CAM Types								
Vitamins	17	*63.0*	12	*75.0*	9	*60.0*	7	*63.6*
Religious healing/prayer	14	*51.9*	13	*81.3*	8	*53.3*	5	*45.5*
Other supplements	5	*18.5*	9	*56.3*	6	*40.0*	3	*27.3*
Relaxation	6	*22.2*	5	*31.3*	3	*20.0*	4	*36.4*
Herbs or botanicals	4	*14.8*	2	*12.5*	5	*33.3*	6	*54.5*
Special diet	6	*22.2*	2	*12.5*	3	*20.0*	3	*27.3*
Energy healing	7	*25.9*	3	*18.8*	2	*13.3*	1	*9.1*
Massage/bodywork	5	*18.5*	2	*12.5*	3	*20.0*	2	*18.2*
Meditation	2	*7.4*	6	*37.5*	1	*6.7*	2	*18.2*
Aromatherapy	2	*7.4*	2	*12.5*	3	*20.0*	4	*36.4*
Guided imagery	5	*18.5*	1	*6.3*	2	*13.3*	2	*18.2*

Note. Readers are directed to several available guides to CAM for explanations of CAM types listed here (e.g., Cassileth, 1998). *n*=number of participants; *Alt* = alternative; Sys=systems; Other Asian includes women of Chinese, Filipino or Korean ancestry.

Emotional Distress Scores and Case Status

The mean scores on the MAC subscales, STAIS, CESD and IES for our participant samples at T1 and T2 closely resemble the published patient population norms (Table 6). Of our sample, between 8.4% (for HH and AP subscales of the MAC) and 22.5% (for the CESD) scored above cut-offs for worse psychological functioning. Six women (8.4%) at T1 and 3 women (7.5%) at T2 reported treatment for anxiety or depression after breast cancer diagnosis, while 32.4% at T1 and 27.5% at T2 reported attending a support group for breast cancer. Twenty-five participants (35.2%) scored above the cut-off on one or more of the HH, AP, STAIS, CESD or IES at T1 and 14 (35%) at T2. These participants were designated as *Cases*, indicating participants with poorer psychological functioning. There is no significant difference between Cases and noncases by CAM use, NCCAM domain or individual CAM type used (Table 7). Cases scored significantly worse on all psychological functioning measures when compared to Noncases.

Table 6. Emotional and Psychological Variables and Published Norms

	T1		T2		Norms
	Mean *(SD)*	*n (%)*	Mean *(SD)*	*n (%)*	Mean *(SD)*
FS	51.88 *(6.3)*		52.90 *(6.1)*		51.5 (5.8)[b]
Score >47		52 (73.2)		28 (70.0)	
HH	8.06 *(2.1)*		7.62 *(2.0)*		9.0 (2.6)[b]
Score >11		6 (8.4)		3 (7.5)	
AP	20.76 *(3.7)*		20.08 *(3.0)*		20.9 (4.2)[b]
Score >25		6 (8.4)		1 (2.5)	
F	17.86 *(2.8)*		18.12 *(3.0)*		17.9 (3.7)[b]
Score >22		4 (5.6)		4 (10.0)	
STAIT	38.01 *(6.8)*		35.41 *(5.8)*		41.3 *(12.5)*[c]
STAIS	39.67 *(8.6)*		35.27 *(6.6)*		42.7 *(13.8)*[c]
Score >49		10 (14.1)		3 (5.0)	
CESD	9.91 *(8.6)*		6.78 *(7.3)*		10.9 *(8.9)*[d]
Score >16		16 (22.5)		6 (15.0)	
IES Total	27.02 *(9.1)*		25.34 *(8.8)*		24.2 *(14.4)*[e]
Score ≥35		15 (21.1)		6 (15.0)	
Intrusive	12.45 *(4.9)*		11.21 *(4.3)*		11.4 *(7.6)*[e]
Avoidance	14.60 *(5.0)*		14.13 *(5.2)*		12.9 *(8.6)*[e]
Cases[a]		25 (35.2)		14 (35.0)	
Psych tx pre-BC		16 (22.5)		10 (25.0)	
Psych tx post-BC		6 (8.4)		3 (7.5)	
Support group		23 (32.4)		11 (27.5)	

Note. FS=fighting spirit; HH=helplessness/hopelessness; AP=anxious preoccupation; F=fatalism; STAIT=State-Trait Anxiety Inventory Trait subscale; STAIS=State-Trait Anxiety Inventory State subscale; CESD=Center for Epidemiological Study Depression Scale; IES=Impact of Event Scale; Psych=psychological or psychiatric; tx=treatment; BC=breast cancer.
[a]Participants meeting cutoff for AP (Watson et al., 1989), HH (Watson et al.), STAIS (Spielberger, et al., 1983), CESD (Devins et al., 1988) or IES (Neal et al., 1994).
[b]179 breast cancer patients (Watson et al.).
[c]161 general medical and surgical patients (Spielberger et al.).
[d]117 breast cancer patients (Hann et al., 1999)
[e]117 recently-diagnosed breast cancer patients (Koopman et al., 2002).

Table 7. Frequency and Means for Emotional and CAM Variables for Cases

	T1		T2	
	N	*%*	*n*	*%*
Psych treatment pre-BC	5	*20.0*	4	*28.57*
Psych treatment post-BC	3	*12.0*	3	*21.43*
Cases using CAM at survey	24	*96.0*	13	*92.86*
NCCAM Domain				
Alternative Medical Systems	5	*20.0*	4	*28.57*
Mind Body	19	*76.0*	12	*85.71*
Biological	17	*68.0*	10	*71.43*
Manipulative	19	*76.0*	11	*78.57*
Energy Therapies	6	*24.0*	4	*28.57*
	Mean	*SD*	Mean	*SD*
Total CAM at survey	4.04	*3.23*	4.64	*2.71*
Age	52.21	12.58	58.36**	12.60
STAIS	46.67**	9.23	40.53**	7.82
CESD	18.15**	9.16	13.97**	8.06
IES	35.92**	7.02	33.77**	7.57
HH	9.37**	2.21	9.12**	2.25
AP	23.53**	2.74	21.86**	2.77

Note. n=25 at T1 n=14 at T2; Psych=psychiatric; BC=breast cancer; NCCAM=National Center for Complementary and Alternative Medicine; STAIS=State-Trait Anxiety Inventory State subscale; CESD=Center for Epidemiological Study Depression scale; IES=Impact of Event Scale; HH=Helplessness/hopelessness subscale; AP=Anxious Preoccupation subscale; Cases meet minimum cutoffs for one or more of STAIS, CESD, IES, HH or AP (see Table 6).
** Significant after Bonferroni adjustment. ($p<.002$; *t* test comparing *cases* with *noncases*.)

Bivariate and Univariate Comparisons

Total CAM at survey was significantly correlated with all other CAM measures

(Tables 8 and 9). In contrast there was less intercorrelation among NCCAM domains,

ranging from a correlation coefficient of .02 for alternative medicine systems and

manipulative and body-based systems to .50 for mind body methods and energy therapies

at T1.

Table 8. Correlation Matrix for Measures of CAM Use at T1

	1	2	3	4	5	6	7	8
1.At survey	1							
2.Ever used	.83	1						
3.Begun after cancer	.51	.44	1					
4.Use frequency	.95	.81	.45	1				
5.ALT	.58	.47	.37	.49	1			
6.MB	.79	.62	.40	.77	.31	1		
7.MAN	.35	.23	.00	.33	.02	.28	1	
8.BIO	.84	.74	.46	.84	.46	.47	.25	1
9.ET	.57	.50	.23	.52	.28	.50	.03	.29

Note. All correlation coefficients above .24 are significant at $p<.05$. ALT=alternative
Medicine Systems; MB=mind body interventions; MAN=manipulative and body-based
methods; BIO=biologically-based treatments; ET=energy therapies.

Table 9. Correlation Matrix for Measures of CAM Use at T2

	1	2	3	4	5	6	7	8
1.At survey	1							
2.Ever used	.85	1						
3.Begun after cancer	.53	.47	1					
4.Use frequency	.93	.84	.54	1				
5.ALT	.55	.66	.15	.57	1			
6.MB	.68	.42	.25	.53	.21	1		
7.MAN	.41	.29	.26	.37	.02	.12	1	
8.BIO	.75	.73	.41	.75	.38	.14	.28	1
9.ET	.60	.51	.66	.63	.31	.38	.04	.39

Note. All correlation coefficients above .31 are significant at $p<.05$. ALT=alternative Medicine Systems; MB=mind body interventions; MAN=manipulative and body-based methods; BIO=biologically-based treatments; ET=energy therapies.

Bivariate analysis revealed total CAMs used to be inversely correlated with age and positively correlated with two of the MAC subscales (HH and AP) at T1 (Table 10) and with AP at T2 (Table 11), but these correlation coefficients did not remain significant after Bonferroni adjustment. Measures of emotional distress (STAIS, CESD and IES) and AP and HH were significantly correlated with one another, as expected. Looking at repeated measures for participants completing both T1 and T2 ($n=40$), revealed a trend towards improving psychological functioning in AP and CESD with a significant improvement in STAIS after Bonferroni adjustment (Table 12). No significant difference was observed in the number of CAMs used at T1 compared to T2.

Table 10. Correlation Coefficients for Selected Regression Variables T1

		1	2	3	4	5	6	7	8
1.	CAM	1							
2.	Age	-.29*	1						
3.	FS	-.12	.06	1					
4.	HH	.30*	-.30*	-.46**	1				
5.	AP	.25*	-.35**	-.12	.49**	1			
6.	F	.06	.09	.23	.17	.20	1		
7.	STAIS	.13	-.26*	-.40**	.58**	.54**	-.06	1	
8.	CESD	.14	-.36**	-.40**	.62**	.47**	-.04	.77**	1
9.	IES	.05	-.16	-.12	.41**	.57**	.08	.63**	.52**

Note. FS=fighting spirit; HH=helplessness/hopelessness; AP=anxious preoccupation; F=fatalism; STAIS=State-Trait Anxiety Inventory State subscale; CESD=Center for Epidemiological Study Depression Scale; IES=Impact of Event Scale;
* $p<.05$
** $p<.01$

Table 11. Correlation Coefficients for Selected Regression Variables T2

		1	2	3	4	5	6	7	8
1.	CAM	1							
2.	Age	-.29	1						
3.	FS	-.07	.001	1					
4.	HH	.04	-.04	-.24	1				
5.	AP	.38*	-.51**	-.001	.24	1			
6.	F	-.04	-.01	.31	.16	-.06	1		
7.	STAIS	.15	-.23	-.19	.28	.59**	-.08	1	
8.	CESD	.19	-.25	.13	.56**	.46**	.03	.58**	1
9.	IES	.21	.04	.02	.39*	.56**	.05	.63**	.55**

Note. FS=Fighting Spirit; HH=Helplessness/hopelessness; AP=Anxious Preoccupation; F=Fatalism; STAIS=State-Trait Anxiety Inventory State subscale; CESD=Center for Epidemiological Study Depression Scale; IES=Impact of Event Scale;
* $p<.05$
** $p<.01$

Table 12. Changes in Selected Variables for T2 Responders

	n	T1 Mean (SD)	T2 Mean (SD)	t Value	p > t
Sum of CAMs	40	3.50 (2.72)	3.85 (2.62)	1.13	0.26
Fighting Spirit	37	52.64 (6.07)	52.90 (6.10)	-0.61	0.55
Help/hopelessness	39	7.75 (2.13)	7.62 (2.01)	-1.23	0.23
Anxious Preoccupation	39	21.10 (3.73)	20.08 (2.98)	-2.21	0.03
Fatalism	38	17.89 (2.86)	18.12 (3.03)	0.54	0.59
STAIS	39	38.50 (8.51)	35.27 (6.64)	-4.45**	<.0001
CESD	39	9.59 (8.06)	6.78 (7.32)	-2.62	0.01
IES	39	26.81 (9.47)	25.34 (8.76)	-1.69	0.10

Note. STAIS=State-Trait Anxiety Inventory – State subscale; CESD=Center for Epidemiological Studies Depression Scale; IES=Impact of Event Scale.
**- significant after Bonferroni adjustment ($p<.002$).

Univariate analyses revealed significant relationships ($p<.05$) for three of the predictor variables, with only AP case status remaining significant after Bonferroni adjustment. Being younger, meeting criteria for AP case status and F case status predicted more CAM use at T1. At T2, being single, having had a lumpectomy, and higher levels of AP predicted more CAM use, although none of the relationships remained significant after Bonferroni adjustment (Table 13).

Table 13. Univariate Comparisons with Total CAM

	T1		T2	
	F value	*p > F*	*F value*	*p > F*
Step 1				
Sociodemographic and clinical variables				
Age	6.55	.013*	3.36	.075
Ethnicity	.89	.478	0.69	.60
Partnered vs. single	3.80	.055	4.26*	.046
Income	.81	.526	.21	.929
Education	.68	.566	1.19	.329
Stage	.20	.937	1.07	.385
Lumpectomy vs. not	2.55	.115	4.94*	.032
Mastectomy vs. not	1.94	.168	1.12	.297
Chemotherapy vs. not	.19	.668	1.12	.297
Radiation vs. not	3.44	.068	.87	.356
Step 2				
Reaction to cancer				
FS case vs. not	.27	.603	.30	.586
HH case vs. not	.56	.458	.11	.744
AP case[a] vs. not	15.37**	.0002	6.32*	.016
F case vs. not	4.08*	.047	3.01	.091
Step 3				
Emotional distress				
CESD	1.31	.256	1.37	.249
STAIS	1.23	.271	.87	.356
IES	.20	.652	1.62	.210

Note. FS=Fighting Spirit; HH=Helplessness/hopelessness; AP=Anxious Preoccupation; F=Fatalism; STAIS=State-Trait Anxiety Inventory State subscale; CESD=Center for Epidemiological Study Depression Scale; IES=Impact of Event Scale.
[a]AP is continuous variable for T2 due to low number of cases.
*$p<.05$.
** significant after Bonferroni adjustment ($p<.001$).

Repeated Measures Analysis: Effect of Emotional Distress on CAM Use

In the multilevel modeling analysis exploring the effects of CESD and STAIS on total CAMs used, we included age and marital status in the analysis because these demographic characteristics were significant at $p <.05$ in the univariate comparisons (Table 14). Younger age and single marital status predicted greater CAM use, and no effects of CESD or STAIS were observed on CAM use. No time by CESD or time by STAIS interaction was observed. When this analysis was conducted using only participants that completed both surveys (n=40), the results were similar: younger age and being single remained significant at the $p<.05$ level (Table 15).

Table 14. Results from Multilevel Modeling Analysis on Total CAM for All Participants

Effect	B	Standard Error	DF	t Value	$p > t$
Months since diagnosis	0.10	0.06	34	1.79	.08
Age	-0.08	0.03	34	2.92**	.006
Partnered vs. single	-1.91	.67	67	2.88**	.005
CESD	0.03	0.04	34	.84	.41
STAIS	0.05	0.05	34	1.04	.64
Months*CESD	0.01	.01	32	1.01	.32
Months*STAIS	0.005	.01	32	0.47	.64

Note. STAIS=State-Trait Anxiety Inventory State subscale; CESD=Center for Epidemiological Study Depression Scale.
**p<.01

Table 15. Results from Multilevel Modeling Analysis on Total CAM for T2 Responders

Effect	B	Standard Error	DF	t Value	p > t
Months since diagnosis	0.08	0.06	34	1.36	.18
Age	-0.08	0.04	34	2.41*	.02
Partnered vs. single	-2.16	.84	38	2.58*	.01
CESD	0.04	0.05	34	.85	.40
STAIS	0.03	0.05	34	.67	.51
Months*CESD	0.01	.01	32	.75	.46
Months*STAIS	0.007	.01	32	.75	.46

Note. STAIS=State-Trait Anxiety Inventory State subscale; CESD=Center for Epidemiological Study Depression Scale.
* $p<.05$.

Effect of CAM use on Later Emotional Distress

The results of the multiple regression analyses looking at the effect of CAM use at T1 on anxiety and depression at T2 shows varying effects by NCCAM domain. Younger age and greater use of alternative medical systems and energy therapies at T1 predicted higher levels of anxiety as measured by the STAIS at T2, while greater use of biologically-based treatments at T1 predicted lower levels of anxiety at T2. Greater use of mind body interventions approached significance ($p=.058$) as a predictor of lower levels of anxiety (Table 16). Similar results were seen for depression: greater use of alternative medical systems at T1 predicted higher levels and greater use of biologically-based treatments at T1 predicted lower levels of depression at T2 as measured by the CESD (Table 17).

Table 16. Results of Multiple Regression Analysis on STAIS at T2

Variable	B	Standard Error	B	t value	$p > t$
Age	-0.21	0.09	-.32	-2.18*	.037
Late stage	1.04	2.45	.06	0.42	.376
Alt Med Systems	5.05	1.90	.46	2.66*	.012
Mind Body Interventions	-1.99	1.01	-.35	-1.97	.058
Manipulative Body-based	0.26	1.21	.03	0.22	.831
Biologically-based Treatments	-2.90	1.06	-.49	-2.73*	.010
Energy Therapies	7.24	2.05	.61	3.53**	.001

Note. df=38; Adjusted R^2=.32; predictor variables measured at T1; STAIS=State-Trait Anxiety Inventory State subscale; late stage=stage 3 and stage 4 disease.
* $p<.05$. ** $p<.01$

Table 17. Results of Multiple Regression Analysis on CESD at T2

Variable	B	Standard Error	β	t value	$p > t$
Age	-0.12	0.10	-.16	-1.21	.237
Late stage	3.65	2.52	0.19	1.45	.158
Alt Med Systems	7.56	1.97	.64	3.84**	<.001
Mind Body Interventions	0.32	1.03	.05	0.31	.761
Manipulative Body-based	0.43	1.24	.05	0.35	.740
Biologically-based Treatments	-3.02	1.07	-.48	-2.82**	.008
Energy Therapies	4.18	2.10	.32	1.99	.055

Note. df=38; Adjusted R^2=.41; predictor variables measured at T1; CESD=Center for Epidemiological Study Depression Scale; late stage=stage 3 and stage 4 disease.
** $p<.01$

Cross-sectional Analysis

We entered those variables that were significant at the $p<.05$ level in the univariate analysis (Table 13) along with CESD and STAIS into a stepwise multiple regression analysis based upon theoretical groupings of variables (Table 18). Socio-demographic and clinical variables at T1 (age) accounted for 7% of the variance in total CAMs used. Adding coping (reaction to cancer variables: AP case status and F Case Status) increased the variance accounted for to 20%, a significant increase. Adding the emotional distress variables (CESD and STAIS) however, did not significantly increase the amount of variance explained by the model. AP case status was the only variable to remain significant at the $p<.05$ level in either Step 2 or Step 3.

Table 18. Results of Hierarchical Multiple Regression Analysis on Total CAM at T1

Variable	B	β	Adj R^2 for Each Step	F value for change in model R^2
Step 1: Sociodemographic and clinical variables			.07	
Age	-.07	-0.294*		
Step 2: Coping			.20	5.18**
Age	-0.05	-.21		
AP Case vs. not	3.64	.36**		
Fatalism Case vs. not	.99	.08		
Step 3: Emotional distress			.17	-1.32
Age	-0.06	-.22		
AP Case vs. not	3.86	0.38		
Fatalism Case vs. not	.83	0.07		
STAIS	-.01	-0.04		
CESD	-.01	-0.03		

Note. df=67; R^2 values are shown cumulatively by step. AP=Anxious Preoccupation; STAIS=State-Trait Anxiety Inventory State subscale; CESD=Center for Epidemiological Study Depression Scale.
* p<.05.
**p<.01.

At T2, socio-demographic and clinical variables (partnered vs. single and lumpectomy vs. not) accounted for 15% of the variance in total CAM used (Table 19). Adding coping variables (AP) increased the variance accounted for to 25%, a significant increase. Adding the emotional distress variables (CESD and STAIS) however, did not significantly increase the amount of variance explained by the model. At Step 2, the variables in this analysis that were found to be significantly related to total CAM used at the p<.05 level were being single and AP. None of the variables were significant at Step 3.

Table 19. Results of Hierarchical Multiple Regression Analysis on Total CAM at T2

Variable	B	β	Adj R^2 for Each Step	F value for Change in Model R^2
Step 1: Sociodemographic and clinical variables			.15	
Partnered vs. single	-1.62	-0.28		
Lumpectomy vs. not	-1.76	-0.30*		
Step 3: Reaction to cancer			.25	4.62*
Partnered vs. single	-1.78	-0.31*		
Lumpectomy vs. not	-1.32	-0.23		
Anxious Preoccupation	0.30	0.35*		
Step 4: Emotional distress			.16	-1.72
Partnered vs. single	-1.70	-.29		
Lumpectomy vs. not	-1.33	-.23		
Anxious Preoccupation	0.29	.33		
STAIS	-0.003	.01		
CESD	0.004	.01		

Note. df=37; R^2 values are shown cumulatively by step. CESD=Center for Epidemiological Study Depression Scale; STAIS=State-Trait Anxiety Inventory State subscale.
* $p<.05$.

DISCUSSION

Summary of Findings

This longitudinal study explored emotional distress, coping response and total CAM use at 2 time points early after diagnosis with breast cancer. Seventy-one women completed the survey at T1 (on average 3 months post-diagnosis) and 40 women completed the follow-up survey at T2 (9 months post-diagnosis). Cross-sectional and repeated measures analysis found no effect for anxiety or depression at T1 and T2 on CAM use at either time point. However, when we looked at earlier CAM use as a predictor of later emotional distress, CAM use predicted anxiety and depression, with the effect varying by type of CAM used. Specifically, greater use at T1 of alternative medical systems, such as acupuncture, naturopathy and homeopathy, predicted significantly worse anxiety and depression scores at T2. In contrast, greater use at T1 of biologically-based treatments, such as vitamins, supplements and herbs, predicted significantly better anxiety and depression scores at T2. Greater use at T1 of energy therapies (e.g., healing touch, reiki, tai chi) also predicted significantly worse anxiety scores but not depression scores at T2. While not significant, greater use at T1 of mind-body therapies, such as prayer, relaxation and meditation, approached significance as a predictor of less anxiety but not depression at T2.

In cross-sectional hierarchical regression analyses at T1 and T2 using theoretical groupings of variables suggested by our model of CAM use, emotional distress variables added no significant improvement in the variance accounted for by the model. Adding coping variables to sociodemographic and clinical variables significantly increased the variance explained by the model. When coping variables were added, higher levels of

anxious preoccupation was a significant predictor of greater CAM use at both T1 and T2. Single marital status also predicted greater CAM use in the cross-sectional regression analysis at T2. Younger age and single marital status also emerged as significant predictors of CAM use in the univariate and multilevel modeling analyses.

CAM Use

Over 90% of the women in our study used one or more types of CAM at the time of the survey. This rate of use is higher than other estimates of CAM use in breast cancer, but recent studies have reported CAM use as high as 87% (Patterson et al., 2002). Given differing definitions from study to study, our definition of CAM may not have been comparable to other studies. For example we included all vitamin use including multi-vitamins as CAM use. Other studies have excluded multi-vitamins from their definition of CAM (e.g., Burstein et al., 1999; Patterson et al.). Also, women who were CAM users may have self-selected or otherwise been more likely to become enrolled in the study.

Participants used an average of 3.5 CAM types and 2.4 NCCAM domains at T1, and 3.9 CAM types and 2.7 NCCAM domains at T2. The most popular types of CAM used were vitamins and other supplements, religious healing or prayer, relaxation techniques, herbs or botanicals and special diets. Correspondingly, the NCCAM domains most frequently used were biologically-based treatments, manipulative and body-based therapies, and mind-body interventions. The most common overall CAM types and NCCAM domains remained relatively consistent across ethnicities.

Previous studies with cancer patients conducted in Hawaii also found that CAM types such as vitamins, herbs, supplements and diets which can be categorized as biologically-based treatments; prayer and meditation (mind body interventions), and

massage (manipulative and body-based therapies) were the most popular among participants (Gotay et al., 1999; Maskarinec et al., 2000; Shumay et al., 2002). Other studies of women with breast cancer also found vitamins, herbs and other supplements (Boon et al., 2000; Lengacher et al., 2002; Patterson et al., 2002), and prayer or spiritual practices (Boon et al.; Lee et al., 2000; Lengacher et al.) to be important. None of the participants in this study reported use of shark cartilage or essiac tea. Earlier studies with cancer patients in Hawaii reported high rates of use of these therapies (Gotay et al., Shumay et al.), and shark cartilage was the most common product suggested by healthfood store personnel for breast cancer in a study conducted in Hawaii (Gotay & Dumitriu, 2000). It is possible that publicity surrounding the lack of research studies demonstrating efficacy for these treatments (NCCAM, 2004) has reached the women in our sample, or that fashions in specific CAM types change (Ernst & Cassileth, 1998).

Predictors of CAM Use
<u>Sociodemographic and Clinical Variables.</u>

Despite previous studies linking education ((Balneaves et al., 1999; Boon et al., 2000; Crocetti et al., 1998; Gotay et al., 1999; Owens et al., 1999; Shumay et al., 2002), income (Boon et al.; Downer et al., 1994), and ethnicity (Lee et al., 2000; Maskarinec et al., 2000; Shumay et al.) to CAM use in cancer patients, our study did not observe these associations. It is possible that our sample was proportionately better educated (42% having attended graduate or professional school) and of higher income (67% > $50,000) than participants in other studies. We did find that younger women were more likely to use CAM in our sample, confirming a number of previous studies (Boon et al.; Crocetti et al.; Gotay et al., 1999; Shumay et al.). Contrary to a study in Hawaii, linking degree of

CAM use with married status in a general cancer sample (Shumay et al.), our current study showed greater CAM use to be associated with single (including divorced and widowed) status. Our study did not show the expected effect of chemotherapy on CAM use as demonstrated previously (Boon et al.; Burstein et al., 1999; Lengacher et al., 2002), nor did it show an effect for stage. A previous study of women with stage I and stage II breast cancer found that women with stage II disease were more likely to use CAM (Burstein et al.)

Coping

Scores on the Mental Adjustment to Cancer subscales: Fighting Spirit, Helplessness/hopelessness, Anxious Preoccupation, and Fatalism closely resembled published norms for breast cancer patients (Watson et al., 1989). Fatalism and anxious preoccupation emerged as predictors of CAM use in the univariate analysis, but only anxious preoccupation remained significant in step two of the hierarchical multiple regression analysis. This finding provides support for a previous study from Sweden in which women with breast cancer who exhibited anxious preoccupation were more likely to enter a complementary medicine clinic (Carlsson et al., 2001).

In our sample, scores on the Anxious Preoccupation subscale were significantly correlated with STAIS state anxiety, CESD depression, and IES trauma scores. However, anxious preoccupation is not always predictive of worse emotional functioning in women with breast cancer (Sherliker & Steptoe, 2000). It is possible that the women who displayed anxious preoccupation were more active in their coping style and less passive. CAM users displayed more negative affect but less escape/avoidance and more problem-

solving or adaptive coping styles than nonusers in a study by Edger et al. (2000).

Balneaves et al. (1999) and Sollner et al. (2000) also found active coping styles to be related to CAM use in cancer patients.

Emotional Distress

We did not find an effect for anxiety or depression on CAM use at any time point in the study. This finding disagrees with the main conclusion of the study by Burstein et al. (1999) in which 480 women, 90% of whom were of Caucasian ethnicity with early stage breast cancer, were surveyed at 3 months and 12 months after initial surgery. Types of CAM therapies were divided into *psychological* and *healing* therapies. New users were those women who adopted CAM for the first time after surgery for breast cancer. Depression, as well as fear of recurrence and greater number of symptoms predicted new use of psychological therapies. Poorer mental health scores and greater number of symptoms predicted new use of healing therapies. This study differs from ours in several ways. First, the authors limited their participants to women with early stage disease, whereas ours included over 11% with stage 3 and stage 4 disease. They also looked at new use of CAM rather than continuous use and had a smaller proportion of CAM users (28% compared to our 90%). In our sample, only one woman who was a nonuser before breast cancer adopted CAM use after breast cancer, so all but one of our CAM users were *continuous users*. Like our study, the study by Burstein et al. did not show a significant effect for emotional or mental functioning on continuous CAM use.

Cross-sectional studies with cancer patients also found poorer emotional functioning (Carlsson et al., 2001; Maskarinec et al., 2000; Moschen et al., 2001) and

anxiety but not depression (Unutzer et al., 2000) to be related to CAM use. In contrast, anxiety and depression were not related to CAM use in a cross-sectional survey conducted in Austria with 174 cancer patients undergoing radiation therapy (Sollner et al., 2000).

The participants in our sample had comparable levels of anxiety, depression and intrusive and avoidance symptoms to other samples. Our participants' mean scores on the STAIS, CESD and IES were similar to published norms with medical patients (STAIS; Spielberger et al., 1983) and breast cancer patients (CESD; Hann et al., 2002) (IES; Koopman et al., 2002). Like anxiety and depression, worse scores on the IES total scale and its subscales did not predict CAM use. We also did not find any differences for anxiety, depression or trauma symptoms on NCCAM domain, including mind-body interventions. We found no differences in CAM types for participants that met cut-off criteria for one or more of the emotional functioning scales (STAIS, CESD, IES, HH, AP) in the study (*cases*). We expected women who were doing worse as measured by these scales to seek out CAM types categorized as mind-body interventions. While it does appear intuitive that women with poorer emotional functioning might seek out CAM in an attempt to treat their psychological symptoms. It may be that CAM use among breast cancer patients has become almost universal, and that users are using CAM for a number of reasons, so that the relationship between emotional distress and CAM is blurred.

Effect of CAM Use on Later Emotional Distress
Our results suggest that CAM use has differential effects on later emotional distress depending upon the type of CAM. We are not aware of other studies, cross-

sectional or longitudinal, that looked at CAM use as a predictor of emotional distress. We would expect mind-body therapies to result in lower anxiety levels, as modalities in this domain have been demonstrated to reduce mood disturbance in women with breast cancer (e.g., Bridge, Benson, Pietroni, & Priest, 1988). Mind body interventions did approach significance as a predictor of lower anxiety in our model. However, it is more difficult to interpret the directions of effect of the significant predictors.

There was a strong effect of alternative medicine systems use on both anxiety and depression, and an effect of energy therapies use on anxiety, leading to worse emotional distress. If the direction of these effects bear out in future studies, we could conjecture that they imply (1) causality, or (2) something systematically different about women that choose these therapies. It is not clear what practices within the alternative medicine systems (primarily acupuncture and naturopathy in our sample) or energy therapies (healing touch, reiki, tai chi and chi gong) might have directly caused worse emotional distress. It is more likely that women who engaged in these systems were less able to rebound from the initial emotional distress after diagnosis possibly from difference in coping abilities (Carlsson et al., 2001) or they had particular expectations about the benefits of alternative medicine systems that were not realized. It is also possible that women who used alternative medicine systems were less satisfied stemming from a greater mistrust in the ability of conventional treatment to treat their disease as has been shown in other CAM users with cancer (Begbie, Kerestes, & Bell, 1996; Boon et al., 2000; Shumay et al., 2002; Shumay, Maskarinec, Kakai, & Gotay, 2001). These possibilities will need to be investigated in future studies. Finally, this finding needs to be replicated, as there may have been something idiosyncratic about our small sample.

Women that used biologically-based treatments were much more likely to do better on later measures of both anxiety and depression. Again, the possibility exists for nutritional improvement through diet and vitamin supplementation, or the actions of herbs and supplements to have an effect on emotional functioning (Linde et al., 2001; Tangney, Young, Murtaugh, Cobleigh, & Oleske, 2002). There also may be something that characterizes women who used more biologically-based treatments that predict their ability to rebound from emotional distress. Use of these modalities is extremely common across studies and many of them (i.e., vitamins and diet) are much less alternative in relationship to existing medical practice than some of the other CAM types (Eisenberg et al., 1998). Their use may be indicative of women who are active collaborators in their biomedical cancer treatment and active problem solvers in general, so that they were able to bounce back from early emotional distress through their coping skills. Again, these questions will need to be answered in future studies.

Theoretical Models of CAM Use

The results of our cross-sectional analysis provided support for including sociodemographic variables (age and marital status) and coping response (anxious preoccupation) but not emotional distress as predictors of CAM use in our theoretical model (Figure 1). In our second model, looking at psychosocial adaptation after a stressful event (Figure 2), we expected CAM use to have a bidirectional relationship with emotional distress. Our study findings and those in our review of the literature suggest that CAM use in the model would be better positioned between mediating variables and adaptation as a second line of resources that are influenced by education, income, social

support, cultural factors and coping response, and that in turn influences emotional
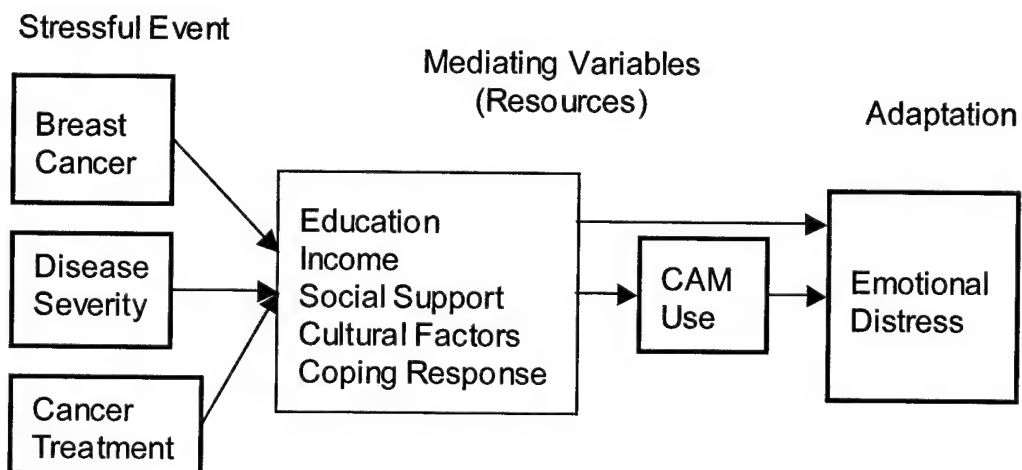
distress. Figure 3 shows the revised model.

Stressful Event

Mediating Variables
(Resources)

Adaptation

Breast
Cancer

Disease
Severity

Cancer
Treatment

Education
Income
Social Support
Cultural Factors
Coping Response

CAM
Use

Emotional
Distress

Figure 3. Revised vulnerability model of psychosocial adaptation with CAM utilization (Adapted from Kornblith, 1998)

Strengths and Limitations of the Study

Our study is one of the few studies of CAM use in breast cancer patients that surveyed women early in their disease, 3 ½ months after diagnosis, and followed them in a longitudinal design. Most studies of determinants of CAM use have employed a cross-sectional design and asked breast cancer survivors several years after diagnosis to recollect CAM use. We also categorized CAM types by established domains developed by NCCAM (2004). This allowed us to look at groups of like modalities within the broad heterogeneous list of CAM types.

All data, including cancer stage and treatment information, were from participant self-report, limiting the validity of some information, as several women were unsure of the stage of their disease. Due to our small sample size; we perhaps did not have sufficient power to detect important differences. Also, our sample was a small proportion of the eligible women with breast cancer in our community, and may not have been representative of the greater population of breast cancer patients. Consequently, the findings of this study are possibly more applicable to Caucasian and Native Hawaiian women then to Japanese and other Asian women with breast cancer in Hawaii. Likewise our group contained younger women and possibly women with higher education and higher income then a more representative sample. Women self-selected for our study, after reading our study materials, and possibly were more likely to enroll because of their own interest or use of CAM or because of their own concerns about emotional distress. We recruited a portion of our sample from a mailing list of women who had contacted the American Cancer Society for participation in their Reach to Recovery program. These

women may have been more likely to utilize resources including CAM than other women.

Future Studies

Future studies should look at motivations and characteristics of users and outcomes of CAM use by different types of CAM. Categorizing by NCCAM domain is one possible system that would allow comparison across studies. Longitudinal studies are also important in the absence of randomized experimental design to look at effects of CAM use. In addition to replicating our findings with a larger more representative sample, future studies should follow participants beyond 9 months to see if the effect of NCCAM domain on anxiety and depression continues. To build on our findings, future investigation could test our revised model (Figure 3) to include the resource variables, such as coping, cultural factors or social support, as well as CAM and emotional distress. Finally, randomized clinical trials of CAM treatments should always include a battery measuring psychological functioning. As suggested by our study, CAM therapies may have unexpected psychological effects.

Implications

With CAM use so common among women with breast cancer, it is probably already more than apparent to healthcare providers that any woman being treated for breast cancer is highly likely to use some form of CAM. Other studies have made the case for improved communication between healthcare providers and patients about CAM (Adler & Fosket, 1999; Tasaki, Maskarinec, Shumay, Tatsumura, & Kakai, 2002). Given the differing effects on emotional functioning, it appears important for healthcare

providers to know the types of CAM women are using and their motivation for doing so. This study having been conducted early in the cancer trajectory when most women were in active cancer treatment, underscores the point that many women are using CAM concurrently with medical treatment. In the case of mind-body interventions, this may be helpful (see review; Astin, Shapiro, Eisenberg, & Forys, 2003); in the case of biologically-based treatments, possibly harmful (see review; Norman et al., 2003).

More worrisome for healthcare providers are the rates of clinically significant and untreated anxiety, depression and trauma symptoms exhibited by women with breast cancer, including those in our study. Thirty-five percent of our sample met cutoffs for worse functioning on one or more scales. But only 21 percent of these women were receiving treatment for anxiety, depression or other mental disorders, despite studies showing the benefit of psychosocial interventions for all women with breast cancer, not just those with diagnosable disorders (Meyer & Mark, 1995). Psychosocial, behavioral and other interventions focused on improving psychological outcome for women with breast cancer need to be routinely incorporated into the cancer treatment protocol. Wherever CAM therapies show demonstrated psychological benefit (e.g., mind-body interventions), they should be offered along with biomedical cancer treatment within an integrative model.

APPENDIX A

Health Therapies Questionnaire

Below is a list of therapies that some people use for health reasons. Please indicate which therapies, if any, that you have tried. And for those you have used, indicate how regularly you have used them and your level of satisfaction. *Please see attached page for definitions of health therapies.*

	Have you ever used this?	Do you currently use this?	Did you start using this before (B) or after (A) cancer diagnosis?	If yes, how regularly have you used this therapy? (circle)							If yes, how satisfied are you with this therapy? (circle)						
				Used once		Somewhat regularly			Very regularly		Very dissatisfied		Neutral			Very satisfied	
Chiropractic	○ Y ○ N	○ Y ○ N	○ B ○ A	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Acupuncture/ Acupressure	○ Y ○ N	○ Y ○ N	○ B ○ A	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Massage therapy or bodywork	○ Y ○ N	○ Y ○ N	○ B ○ A	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Homeopathic medicine	○ Y ○ N	○ Y ○ N	○ B ○ A	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Relaxation techniques	○ Y ○ N	○ Y ○ N	○ B ○ A	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Hypnosis or self-hypnosis	○ Y ○ N	○ Y ○ N	○ B ○ A	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Yoga	○ Y ○ N	○ Y ○ N	○ B ○ A	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Religious heal-ing or prayer	○ Y ○ N	○ Y ○ N	○ B ○ A	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Support group	○ Y ○ N	○ Y ○ N	○ B ○ A	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Osteopathy	○ Y ○ N	○ Y ○ N	○ B ○ A	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Traditional Hawaiian healing	○ Y ○ N	○ Y ○ N	○ B ○ A	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Energy healing (i.e. healing touch, Reiki)	○ Y ○ N	○ Y ○ N	○ B ○ A	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Meditation	○ Y ○ N	○ Y ○ N	○ B ○ A	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Guided imagery/ visualization	○ Y ○ N	○ Y ○ N	○ B ○ A	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Naturopath	○ Y ○ N	○ Y ○ N	○ B ○ A	1	2	3	4	5	6	7	1	2	3	4	5	6	7

ID# ☐ ☐ ☐ ☐

9544

	Have you ever used this?	Do you currently use this?	Did you start using this before (B) or after (A) cancer diagnosis?	If yes, how regularly have you used this therapy? *(circle)*							If yes, how satisfied are you with this therapy? *(circle)*						
				Used once		Somewhat regularly			Very regularly		Very dissatisfied		Neutral			Very satisfied	
Tai Chi or Qi Gong	○ Y ○ N	○ Y ○ N	○ B ○ A	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Aromatherapy	○ Y ○ N	○ Y ○ N	○ B ○ A	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Herbs or botanicals	○ Y ○ N	○ Y ○ N	○ B ○ A	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Special diet	○ Y ○ N	○ Y ○ N	○ B ○ A	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Vitamins	○ Y ○ N	○ Y ○ N	○ B ○ A	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Other supplements	○ Y ○ N	○ Y ○ N	○ B ○ A	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Exercise	○ Y ○ N	○ Y ○ N	○ B ○ A	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Other non-medical therapy	○ Y ○ N	○ Y ○ N	○ B ○ A	1	2	3	4	5	6	7	1	2	3	4	5	6	7

Please list herbal/botanical therapies you take currently:

_____
_____
_____

Please list vitamins, minerals and other supplements you take currently:

_____
_____
_____

Please describe any special diets that you are currently on:

_____
_____
_____

Please list any other non-medical or alternative therapy you have used that is not included on the list above:

_____
_____
_____

What would you like your healthcare team to offer?

Some women find it very helpful to receive supportive training and counseling to help with the stress of breast cancer. Please indicate whether you would use these types of services by answering the questions on the next page...

ID# ☐ ☐ ☐ ☐

9544

1. If your healthcare team offered *relaxation training* would you take it?   ○ Yes   ○ No
   Why or why not?
   _____
   _____

2. If your healthcare team offered *guided imagery* would you take it?   ○ Yes   ○ No
   Why or why not?
   _____
   _____

3. If your healthcare team offered training on how to keep a *positive outlook* would you take it?   ○ Yes   ○ No
   Why or why not?
   _____
   _____

4. If your healthcare team offered *hypnosis* for help with pain/treatment side effects would you take it?   ○ Yes   ○ No
   Why or why not?
   _____
   _____

5. If your healthcare team offered *biofeedback* to help you relax would you take it?   ○ Yes   ○ No
   Why or why not?
   _____
   _____

6. If your healthcare team offered training in *meditation* would you take it?   ○ Yes   ○ No
   Why or why not?
   _____
   _____

7. If your healthcare team offered training in *problem solving skills* would you take it?   ○ Yes   ○ No
   Why or why not?
   _____
   _____

8. If your healthcare team offered *counseling* or *psychotherapy* would you take it?   ○ Yes   ○ No
   Why or why not?
   _____
   _____

9. If your healthcare team offered meetings with a *clergy member* would you take it?   ○ Yes   ○ No
   (e.g., monk, minister, priest, or rabbi.)
   Why or why not?
   _____
   _____

10. Please list any other therapies or training that you'd like your healthcare team to offer:
   _____
   _____
   _____

ID# [ ][ ][ ][ ]

APPENDIX B

9544

Background and Treatment History Questionnaire

1. Your Date of Birth [ ][ ] / [ ][ ] / [ ][ ]
   month / date / year

2. What <u>best</u> describes your ethnicity?
   ○ Caucasian   ○ Chinese   ○ Filipino   ○ Japanese   ○ Hawaiian or part-Hawaiian   ○ Other (Specify Below)

3. What is the highest level of education that you have reached?
   ○ Some high school   ○ HS Diploma or GED   ○ Some college or trade school   ○ Some graduate school   ○ Graduate or prof degree

4. Please list your occupation (If retired, list previous occupation) _____

5. What is your family's annual income?
   ○ <$15,000   ○ $15,000-$25,000   ○ $25,000-$50,000   ○ $50,000-$100,000   ○ >$100,000

6. What is your current marital status?
   ○ Single   ○ Co-habitating   ○ Married   ○ Divorced   ○ Widowed

7. Which treatments have you received for breast cancer? *(Select all that apply)*

   ○ Mastectomy

   ○ Mastectomy with sampling of the lymph nodes

   ○ Mastectomy and reconstruction at the same time

   ○ Lumpectomy (partial mastectomy) with sampling of lymph nodes under arm

   ○ Lumpectomy (partial mastectomy) without sampling of lymph nodes under arm

   ○ Chemotherapy

   ○ Radiation

   ○ Hormonal therapy (e.g. Tamoxifen)

   ○ Breast reconstruction after initial surgery

   ○ Prophylactic surgery (removal of non-cancerous breast to reduce future breast cancer risk)

   ○ None of these

8. Which treatments for breast cancer are you currently undergoing or have received in the past month? *(Select all that apply)*

   ○ Surgery
   ○ Chemotherapy
   ○ Radiation
   ○ Hormone therapy (e.g. Tamoxifen)
   ○ Undergoing no treatment at this time

9. What stage was the breast cancer?
   ○ Stage 1   ○ Stage 2   ○ Stage 3   ○ Stage 4   ○ Don't know

ID# [ ][ ][ ][ ]

9544

10. How big was the tumor? *(Describe below)*

_____

	Yes	No	Don't know
11. Was the tumor *in situ*?	○	○	○
12. Was the cancer found in your lymph nodes?	○	○	○
13. Was the cancer metastasized? (i.e. spread to other parts of the body)	○	○	○

14. Are there any medical treatments that your doctor recommended you   ○   ○
    receive for breast cancer that you chose not to take?   Yes   No

15. If YES to question 14, which treatments that your doctor recommended did you choose not to undergo?
    (Select all that apply)

○ Mastectomy   If you chose not to undergo any treatments, please give reasons below:

○ Lumpectomy

○ Sampling of the lymph nodes   _____

○ Chemotherapy   _____

○ Radiation   _____

○ Hormonal therapy (e.g. Tamoxifen)   _____

○ Prophylactic surgery   _____
  (removal of non-cancerous breast to
  reduce future breast cancer risk)   _____

16. Have you ever been treated for the following? *(Check all that apply)*

a) Depression
  ○ Yes, before diagnosis with cancer
  ○ Yes, after diagnosis with cancer
  ○ No, never been treated

b) Anxiety
  ○ Yes, before diagnosis with cancer
  ○ Yes, after diagnosis with cancer
  ○ No, never been treated

c) Other emotional difficulties
  ○ Yes, before diagnosis with cancer
  ○ Yes, after diagnosis with cancer
  ○ No, never been treated

ID# [ ][ ][ ][ ]

APPENDIX C
Specific Vitamins, Minerals and Other Supplements Used by Participants

Vitamin, Mineral, Supplement	n	Continued	n
Multivitamin/Mineral	45	Iron	2
Calcium	39	Lysine	2
Vitamin E	29	Methylsulfonylmethane	2
Vitamin C	13	Omega-3	2
B-complex	9	Quercetin	2
Coenzyme Q10	7	Zinc	2
Glucosamine	6	Alpha Lipoic Acids	1
Magnesium	6	Choline	1
Selenium	6	Chondroitin	1
Fish Oil	5	Chromium	1
Folic Acid	4	Colodial Silver	1
Vitamin A	3	Copper	1
Vitamin B12	3	Diindolylmethane Complex	1
Vitamin D	3	Glutamycine	1
Ensure™	3	Indol 3 Carbinol	1
Amino Acids	2	Inosital	1
Vitamin B6	2	Lecithin	1
Biotin	2	Niacin	1
Chondroitin	2	Potassium	1
Enzymes	2	Trimethylglycine	1

Note. *n*=number of participants listing use on survey.

APPENDIX D

Specific Herbs and Botanical Products Used by Participants

Herb or botanical	*n*	Continued	*n*
Garlic	5	Chlorella	1
Mixed herb capsules	5	Detox tea	1
Green tea	4	Dong quai	1
Ginger	3	Echinacea	1
Black cohosh	2	Garden teas	1
Flaxseed oil	2	Ginseng	1
Ginko biloba	2	Herbal teas	1
Lemongrass tea	2	Iscador	1
Noni	2	Orange peel tea	1
Pycnogenol	2	Papaya leaf tea	1
Aloe	1	Peppermint tea	1
Arnica	1	Psyllium husks	1
Bitter melon enzymes	1	Rosehip tea	1
Bluegreen algae	1	Senna	1
Body Mint™	1	Super Greens™	1
Chamomile tea	1	Mangosteen capsules	1

Note. n=number of participants listing use on survey.

Special Diets Used by Participants

Special Diet or Food	*n*
Fruits	9
Vegetables	9
Low carbohydrates	6
Less meat or vegetarian	5
Low fat	3
Low sugar	3
Whole grain/high fiber	3
Fish	2
Fruit/Vegetable juices	2
Low caffeine	2
No dairy	2
Aloe	1
Broccoli	1
Chicken	1
Cranberries	1
Diabetic	1
Low sodium	1
No preservatives	1
Organic	1
Poi	1
Protein shakes	1
Healthy recipes	1
Soft foods during chemotherapy	1
Tofu/isoflavones	1

Note. n=number of participants listing use on survey.

APPENDIX F

Other Complementary and Alternative Therapies Used by Participants

Other Therapy
Acupressure bracelet
Arts & crafts
Breathing rhythm
Chinese medicine pellets
Clinical therapist
Correspondence with friends/family
"Kitty therapy"
Listen to music
Magnetic bracelet
Swimming
Tapping

Note. One participant per therapy.

REFERENCES

Adler, S. R. (1999). Complementary and alternative medicine use among women with breast cancer. *Medical Anthropology Quarterly, 13,* 214-222.

Adler, S. R. & Fosket, J. R. (1999). Disclosing complementary and alternative medicine use in the medical encounter: a qualitative study in women with breast cancer. *Journal of Family Practice, 48,* 453-458.

Akechi, T., Okamura, H., Yamawaki, S., & Uchitomi, Y. (1998). Predictors of patients' mental adjustment to cancer: patient characteristics and social support. *British Journal of Cancer, 77,* 2381-2385.

American Cancer Society (2003). *Hawaii cancer facts and figures 2003-2004.* Honolulu: American Cancer Society, Hawaii Pacific, Inc.

Andersen, R. (1973). Societal and individual determinants of medical care utilization in the United States. *The Milbank Quarterly 51,* 95-124.

Andersen, R. M. (1995). Revisiting the behavioral model and access to medical care: does it matter? *Journal of Health and Social Behavior 36,* 1-10.

Andrykowski, M. A. & Cordova, M. J. (1998). Factors associated with PTSD symptoms following treatment for breast cancer: test of the Andersen model. *Journal of Traumatic Stress, 11,* 189-203.

Astin, J. A., Shapiro, S. L., Eisenberg, D. M., & Forys, K. L. (2003). Mind-body medicine: state of the science, implications for practice. *Journal of the American Board of Family Practice, 16,* 131-147.

Badger, T. A., Braden, C. J., & Mishel, M. H. (2001). Depression burden, self-help interventions, and side effect experience in women receiving treatment for breast cancer. *Oncology Nursing Forum, 28,* 567-574.

Balneaves, L. G., Kristjanson, L. J., & Tataryn, D. (1999). Beyond convention: describing complementary therapy use by women living with breast cancer. *Patient Education and Counseling, 38,* 143-153.

Begbie, S. D., Kerestes, Z. L., & Bell, D. R. (1996). Patterns of alternative medicine use by cancer patients. *Medical Journal of Australia, 165,* 545-548.

Boon, H., Stewart, M., Kennard, M. A., Gray, R., Sawka, C., Brown, J. B. et al. (2000). Use of complementary/alternative medicine by breast cancer survivors in Ontario: prevalence and perceptions. *Journal of Clinical Oncology, 18,* 2515-2521.

Bridge, L. R., Benson, P., Pietroni, P. C., & Priest, R. G. (1988). Relaxation and imagery in the treatment of breast cancer. *BMJ, 297,* 1169-1172.

Burgess, C., Morris, T., & Pettingale, K. W. (1988). Psychological response to cancer diagnosis--II. Evidence for coping styles (coping styles and cancer diagnosis). *Journal of Psychosomatic Research, 32,* 263-272.

Burstein, H. J., Gelber, S., Guadagnoli, E., & Weeks, J. C. (1999). Use of alternative medicine by women with early-stage breast cancer. *New England Journal of Medicine, 340,* 1733-1739.

Carlsson, M., Arman, M., Backman, M., & Hamrin, E. (2001). Perceived quality of life and coping for Swedish women with breast cancer who choose complementary medicine. *Cancer Nursing, 24,* 395-401.

Cassileth, B. R. (1998). *The alternative medicine handbook: The complete reference guide to alternative and complementary therapies.* New York: W.W. Norton & Company Inc.

Cassileth, B. R., Lusk, E. J., Strouse, T. B., & Bodenheimer, B. J. (1984). Contemporary unorthodox treatments in cancer medicine. A study of patients, treatments, and practitioners. *Annals of Internal Medicine, 101,* 105-112.

Cimprich, B. (1999). Pretreatment symptom distress in women newly diagnosed with breast cancer. *Cancer Nursing, 22,* 185-194.

Cordova, M. J., Andrykowski, M. A., Kenady, D. E., McGrath, P. C., Sloan, D. A., & Redd, W. H. (1995). Frequency and correlates of posttraumatic-stress-disorder-like symptoms after treatment for breast cancer. *Journal of Consulting and Clinical Psychology, 63,* 981-986.

Crocetti, E., Crotti, N., Feltrin, A., Ponton, P., Geddes, M., & Buiatti, E. (1998). The use of complementary therapies by breast cancer patients attending conventional treatment. *European Journal of Cancer, 34,* 324-328.

Devins, G. M., Orme, C. M., Costello, C. G., Blinik, Y. M., Frizzell, B., Stam, H. J. et al. (1988). Measuring depressive symptoms in illness populations: Psychometric properties of the Center for Epidemiologic Studies Depression (CES-D) Scale. *Psychology and Health, 2,* 139-156.

Downer, S. M., Cody, M. M., McCluskey, P., Wilson, P. D., Arnott, S. J., Lister, T. A. et al. (1994). Pursuit and practice of complementary therapies by cancer patients receiving conventional treatment. *British Medical Journal, 309,* 86-89.

Dugan, W., McDonald, M. V., Passik, S. D., Rosenfeld, B. D., Theobald, D., & Edgerton, S. (1998). Use of the Zung Self-Rating Depression Scale in cancer patients: feasibility as a screening tool. *Psychooncology, 7,* 483-493.

Edgar, L., Remmer, J., Rosberger, Z., & Fournier, M. A. (2000). Resource use in women completing treatment for breast cancer. *Psychooncology, 9,* 428-438.

Eisenberg, D. M., Davis, R. B., Ettner, S. L., Appel, S., Wilkey, S., Van, R. M. et al. (1998). Trends in alternative medicine use in the United States, 1990-1997: results of a follow-up national survey. *JAMA, 280,* 1569-1575.

Ell, K., Nishimoto, R., Morvay, T., Mantell, J., & Hamovitch, M. (1989). A longitudinal analysis of psychological adaptation among survivors of cancer. *Cancer, 63,* 406-413.

Epping-Jordan, J. E., Compas, B. E., Osowiecki, D. M., Oppedisano, G., Gerhardt, C., Primo, K. et al. (1999). Psychological adjustment in breast cancer: Processes of emotional distress. *Health Psychology, 18,* 315-326.

Ernst, E. & Cassileth, B. R. (1998). The prevalence of complementary/alternative medicine in cancer: A systematic review. *Cancer, 83,* 777-782.

Fallowfield, L. J., Hall, A., Maguire, G. P., & Baum, M. (1990). Psychological outcomes of different treatment policies in women with early breast cancer outside a clinical trial. *British Medical Journal, 301,* 575-580.

Goldstein, H. (1995). *Multilevel statistical models.* New York: Halstead Press.

Gotay, C. C. & Dumitriu, D. (2000). Health food store recommendations for breast cancer patients. *Archives of Family Medicine, 9,* 692-699.

Gotay, C. C., Hara, W., Issell, B. F., & Maskarinec, G. (1999). Use of complementary and alternative medicine in Hawaii cancer patients. *Hawaii Medical Journal, 58,* 94-98.

Grassi, L. & Rosti, G. (1996). Psychosocial morbidity and adjustment to illness among long-term cancer survivors. A six-year follow-up study. *Psychosomatics, 37,* 523-532.

Greer, S., Moorey, S., & Watson, M. (1989). Patients' adjustment to cancer: the Mental Adjustment to Cancer (MAC) scale vs clinical ratings. *Journal of Psychosomatic Research, 33,* 373-377.

Greer, S., Morris, T., & Pettingale, K. W. (1979). Psychological response to breast cancer: effect on outcome. *Lancet, 2,* 785-787.

Hann, D., Baker, F., Denniston, M., Gesme, D., Reding, D., Flynn, T. et al. (2002). The influence of social support on depressive symptoms in cancer patients: age and gender differences. *Journal of Psychosomatic Research, 52,* 279-283.

Hann, D., Winter, K., & Jacobsen, P. (1999). Measurement of depressive symptoms in cancer patients: evaluation of the Center for Epidemiological Studies Depression Scale (CES-D). *Journal of Psychosomatic Research, 46,* 437-443.

Hatcher, L. & Stepanski, E. J. (1999). *A step-by-step approach to using the SAS system for univariate and multivariate statistics*. Cary, N.C.: SAS Institute Inc.

Henderson, J. W. & Donatelle, R. J. (2003). The relationship between cancer locus of control and complementary and alternative medicine use by women diagnosed with breast cancer. *Psychooncology, 12*, 59-67.

Horowitz, M., Wilner, N., & Alvarez, W. (1979). Impact of Event Scale: a measure of subjective stress. *Psychosomatic Medicine, 41*, 209-218.

Hox, J. J. (2002). *Multilevel analysis: techniques and applications*. Mahwah, NJ: Lawrence Erlbaum Associates.

Jemal, A., Thomas, A., Murray, T., & Thun, M. (2002). Cancer statistics, 2002. *CA Cancer Journal for Clinicians, 52*, 23-47.

Koopman, C., Butler, L. D., Classen, C., Giese-Davis, J., Morrow, G. R., Westendorf, J. et al. (2002). Traumatic stress symptoms among women with recently diagnosed primary breast cancer. *Journal of Traumatic Stress, 15*, 277-287.

Kornblith, A. B. (1998). Psychosocial adaptation of cancer survivors. In J.Holland (Ed.), Psycho-Oncology , 223-254.

Lampic, C., Wennberg, A., Schill, J. E., Glimelius, B., Brodin, O., & Sjoden, P. O. (1994). Coping, psychosocial well-being and anxiety in cancer patients at follow-up visits. *Acta Oncologica, 33*, 887-894.

Lee, M. M., Lin, S. S., Wrensch, M. R., Adler, S. R., & Eisenberg, D. (2000). Alternative therapies used by women with breast cancer in four ethnic populations. *Journal of the National Cancer Institute, 92*, 42-47.

Lengacher, C. A., Bennett, M. P., Kip, K. E., Keller, R., LaVance, M. S., Smith, L. S. et al. (2002). Frequency of use of complementary and alternative medicine in women with breast cancer. *Oncology Nursing Forum, 29*, 1445-1452.

Lerner, I. J. & Kennedy, B. J. (1992). The prevalence of questionable methods of cancer treatment in the United States. *CA: A Cancer Journal for Clinicians, 42*, 181-191.

Linde, K., ter Riet, G., Hondras, M., Vickers, A., Saller, R., & Melchart, D. (2001). Systematic reviews of complementary therapies - an annotated bibliography. Part 2: herbal medicine. *BMC.Complementary and Alternative Medicine, 1*, 5.

Maskarinec, G., Shumay, D. M., Kakai, H., & Gotay, C. C. (2000). Ethnic differences in complementary and alternative medicine use among cancer patients. *The Journal of Alternative and Complementary Medicine, 6*, 531-538.

Maunsell, E., Brisson, J., & Deschenes, L. (1992). Psychological distress after initial treatment of breast cancer. Assessment of potential risk factors. *Cancer, 70,* 120-125.

Meyer, T. J. & Mark, M. M. (1995). Effects of psychosocial interventions with adult cancer patients: a meta-analysis of randomized experiments. *Health Psychology, 14,* 101-108.

Miller, M., Boyer, M. J., Butow, P. N., Gattellari, M., Dunn, S. M., & Childs, A. (1998). The use of unproven methods of treatment by cancer patients. Frequency, expectations and cost. *Supportive Care in Cancer, 6,* 337-347.

Morasso, G., Costantini, M., Viterbori, P., Bonci, F., Del Mastro, L., Musso, M. et al. (2001). Predicting mood disorders in breast cancer patients. *European Journal of Cancer, 37,* 216-223.

Moschen, R., Kemmler, G., Schweigkofler, H., Holzner, B., Dunser, M., Richter, R. et al. (2001). Use of alternative/complementary therapy in breast cancer patients--a psychological perspective. *Supportive Care in Cancer, 9,* 267-274.

NCCAM (2004). Major domains of complementary and alternative medicine. National Center for Complementary and Alternative Medicine [On-line]. Available: http://altmed.od.nih.gov/health/whatiscam/#4

Neal, L. A., Busuttil, W., Rollins, J., Herepath, R., Strike, P., & Turnbull, G. (1994). Convergent validity of measures of post-traumatic stress disorder in a mixed military and civilian population. *Journal of Traumatic Stress, 7,* 447-455.

Norman, H. A., Butrum, R. R., Feldman, E., Heber, D., Nixon, D., Picciano, M. F. et al. (2003). The role of dietary supplements during cancer therapy. *Journal of Nutrition, 133,* 3794S-3799S.

Osborne, R. H., Elsworth, G. R., Kissane, D. W., Burke, S. A., & Hopper, J. L. (1999). The Mental Adjustment to Cancer (MAC) Scale: Replication and refinement in 632 breast cancer patients. *Psychological Medicine, 29,* 1335-1345.

Owens, J. E., Taylor, A. G., & Degood, D. (1999). Complementary and alternative medicine and psychologic factors: toward an individual differences model of complementary and alternative medicine use and outcomes. *Journal of Alternative and Complementary Medicine, 5,* 529-541.

Passik, S. D. & McDonald, M. V. (1998). Psychosocial aspects of upper extremity lymphedema in women treated for breast carcinoma. *Cancer, 83,* 2817-2820.

Patterson, R. E., Neuhouser, M. L., Hedderson, M. M., Schwartz, S. M., Standish, L. J., Bowen, D. J. et al. (2002). Types of alternative medicine used by patients with breast, colon, or prostate cancer: predictors, motives, and costs. *Journal of Alternative and Complementary Medicine, 8,* 477-485.

Payne, D. K., Sullivan, M. D., & Massie, M. J. (1996). Women's psychological reactions to breast cancer. *Seminars in Oncology, 23,* 89-97.

Radloff, L. S. (1977). The CES-D Scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1,* 385-401.

Raudenbush, S. W. & Bryk, A. S. (2002). *Hierarchical linear models: applications and data analysis methods.* London: Sage Publications.

Rees, R. W., Feigel, I., Vickers, A., Zollman, C., McGurk, R., & Smith, C. (2000). Prevalence of complementary therapy use by women with breast cancer. A population-based survey. *European Journal of Cancer, 36,* 1359-1364.

Salmenpera, L., Suominen, T., Lauri, S., & Puukka, P. (2001). Attitudes of patients with breast and prostate cancer toward complementary therapies in Finland. *Cancer Nursing, 24,* 328-334.

SAS Institute Inc. (1991). SAS Technical Report P-217 (Version 6) [Computer software]. Cary, NC.: SAS Institute, Inc.

Shapiro, S. L., Lopez, A. M., Schwartz, G. E., Bootzin, R., Figueredo, A. J., Braden, C. J. et al. (2001). Quality of life and breast cancer: relationship to psychosocial variables. *Journal of Clinical Psychology, 57,* 501-519.

Sherliker, L. & Steptoe, A. (2000). Coping with new treatments for cancer: a feasibility study of daily diary measures. *Patient Education and Counseling, 40,* 11-19.

Shumay, D. M., Maskarinec, G., Gotay, C. C., Heiby, E. M., & Kakai, H. (2002). Determinants of the degree of complementary and alternative medicine use among patients with cancer. *Journal of Alternative and Complementary Medicine, 8,* 661-671.

Shumay, D. M., Maskarinec, G., Kakai, H., & Gotay, C. C. (2001). Why some cancer patients choose complementary and alternative medicine instead of conventional treatment. *Journal of Family Practice, 50,* 1067.

Sollner, W., Maislinger, S., DeVries, A., Steixner, E., Rumpold, G., & Lukas, P. (2000). Use of complementary and alternative medicine by cancer patients is not associated with perceived distress or poor compliance with standard treatment but with active coping behavior: a survey. *Cancer, 89,* 873-880.

Spielberger, C. D., Gorsuch, R. L., & Lushene, R. E. (1970). *Manual for the State-Trait Anxiety Inventory.* Palo Alto: Consulting Psychologist Press.

Spielberger, C. D., Gorsuch, R. L., Lushene, R. E., Vagg, P. R., & Jacobs, J. J. (1983). *State-Trait Anxiety Inventory for Adults Form Y: Review set.* Redwood City, CA: Mind Garden, Inc.

Tangney, C. C., Young, J. A., Murtaugh, M. A., Cobleigh, M. A., & Oleske, D. M. (2002). Self-reported dietary habits, overall dietary quality and symptomatology of breast cancer survivors: a cross-sectional examination. *Breast Cancer Research and Treatment, 71,* 113-123.

Tasaki, K., Maskarinec, G., Shumay, D. M., Tatsumura, Y., & Kakai, H. (2002). Communication between physicians and cancer patients about complementary and alternative medicine: exploring patients' perspectives. *Psychooncology., 11,* 212-220.

Tjemsland, L., Soreide, J. A., & Malt, U. F. (1998). Posttraumatic distress symptoms in operable breast cancer III: status one year after surgery. *Breast Cancer Research and Treatment, 47,* 141-151.

Unutzer, J., Klap, R., Sturm, R., Young, A. S., Marmon, T., Shatkin, J. et al. (2000). Mental disorders and the use of alternative medicine: results from a national survey. *American Journal of Psychiatry, 157,* 1851-1857.

van't Spijker, A., Trijsburg, R. W., & Duivenvoorden, H. J. (1997). Psychological sequelae of cancer diagnosis: a meta-analytical review of 58 studies after 1980. *Psychosomatic Medicine, 59,* 280-293.

Vinokur, A. D., Threatt, B. A., Caplan, R. D., & Zimmerman, B. L. (1989). Physical and psychosocial functioning and adjustment to breast cancer. Long-term follow-up of a screening population. *Cancer, 63,* 394-405.

Walker, L. G. (1998). Psychosocial aspects of cancer in the elderly. *European Journal of Surgical Oncology, 24,* 375-378.

Watson, M., Greer, S., Blake, S., & Shrapnell, K. (1984). Reaction to a diagnosis of breast cancer. Relationship between denial, delay and rates of psychological morbidity. *Cancer, 53,* 2008-2012.

Watson, M., Greer, S., & Bliss, J. M. (1989). *Mental Adjustment to Cancer (MAC) scale: users' manual.*

Watson, M., Greer, S., Rowden, L., Gorman, C., Robertson, B., Bliss, J. M. et al. (1991). Relationships between emotional control, adjustment to cancer and depression and anxiety in breast cancer patients. *Psychological Medicine, 21,* 51-57.

Watson, M., Greer, S., Young, J., Inayat, Q., Burgess, C., & Robertson, B. (1988). Development of a questionnaire measure of adjustment to cancer: the MAC scale. *Psychological Medicine, 18,* 203-209.

Watson, M., Haviland, J. S., Greer, S., Davidson, J., & Bliss, J. M. (1999). Influence of psychological response on survival in breast cancer: A population-based cohort study. *Lancet, 354,* 1331-1336.

Weis, J., Bartsch, H. H., Hennies, F., Rietschel, M., Heim, M., Adam, G. et al. (1998). Complementary medicine in cancer patients: Demand, patients' attitudes and psychological beliefs. *Onkologie, 21,* 144-149.

Weissman, M. M., Sholomskas, D., Pottenger, M., Prusoff, B. A., & Locke, B. Z. (1977). Assessing depressive symptoms in five psychiatric populations: A validation study. *American Journal of Epidemiology, 106,* 203-214.

Yates, P. M., Beadle, G., Clavarino, A., Najman, J. M., Thomson, D., Williams, G. et al. (1993). Patients with terminal cancer who use alternative therapies: Their beliefs and practices. *Sociology of Health & Illness, 15,* 199-216.

Zilberg, N. J., Weiss, D. S., & Horowitz, M. J. (1982). Impact of Event Scale: a cross-validation study and some empirical evidence supporting a conceptual model of stress response syndromes. *Journal of Consulting and Clinical Psychology, 50,* 407-414.